

## A Year in the Life

*Our ears were assailed by a murmuring noise. As we drew near it grew to a tremendous roaring, such as to deafen us ... several thousand of these furious animals, roaring and rushing upon each other ... the earth trembled beneath their feet, the air was deafened, and the grove was shaken with the shock of their tremendous battle. – Henry Brackenridge, 1811*

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A review of the life cycle and seasonal round of bison may seem academic, but it is crucial to understanding the operation of a buffalo jump. The physical characteristics of the animal change dramatically over the course of a year based on such factors as age, sex, and season. Hunters were acutely aware of these changes; they had to be, for the differing status of bison throughout the year spelled the difference between life and death. It is not hard to imagine that people who lived mainly on a meat diet, and had done so for thousands of years, had long ago worked out which animals were best suited to keeping them alive and which are relatively useless. As will be seen a number of times in this book, modern science is just catching up to what Aboriginal people have long known and used to their advantage. We should expect no less. After all, one group has been researching, observing, and generally paying attention to these facts for a vastly longer period of time. For one group it was a matter of life and death, for the other it's a research project.



*The bison family: from left, cow, calf, and bull. (Courtesy Wes Olson)*

## Calves

*The Calves in the Womb are now all well covered with hair. These all Indians are remarkably fond of even when not more than the size of a quart pot they eat them.* – Peter Fidler, 1792–93

Although newborn calves can be seen in a herd at almost any time of the year, most bison calves come into this world in April and May. With a gestation period of nine months, this means that the females are getting pregnant in the rutting season in late July and in August and early September. Humans are one of the species that give birth year round. Many species need to time their birth cycle to give the young a chance to grow during times when risks to their survival are minimized. Humans must nurture and protect their young for years after birth, so it really doesn't matter when they are born, especially since we started living in shelters and crowding around fires. Most other animals have to survive on their own relatively quickly after birth and thus need all the advantages they can get to make it into adulthood. Bison on the northern Plains live in a part of the world noted for strong pulses in the seasons – hard, cold winters and warm, lazy summers. Peak calving in the spring gives the newborn an opportunity to graze on the best forage they are going to find. The fast-growing grass of spring, rich in flowers and seeds, is much richer in protein than the drier grasses of mid- and later summer. Calves put on weight, gain strength, and build up body reserves in muscle



*Bison calves, which are reddish brown at birth, can walk within hours. (Courtesy William S. Keller, U.S. National Park Service)*

and fat that will give them a decent chance of making it through their first winter. Calves born out of the normal season are often doomed to be removed from the gene pool. Thus does the benign indifference of nature construct its tendencies, promoting the regularities and discouraging the deviations that enhance the chances of survival.

Calves weigh a surprisingly light fifteen to twenty kilograms at birth, not much larger than an elk calf and smaller than beef calves. Most of this initial weight is muscle, bone, and hide. They have little fat when young, and their immediate need is to walk with the mother and the herd and to run from predators. These needs are met by the early development of muscle and bone. If you have ever watched a foal drop from a mare, it is an amazing experience. This gangly, slime-encrusted baby falls to the ground, looking like all legs and a head. But within minutes, with nudging and licking from the mother, it is trying and succeeding to stand. A human will take a year or more to reach this same stage of development. Human babies aren't expected to run from trouble; parents carry them. By the end of their first summer bison calves have gained more than one hundred kilograms, are starting to put on fat, and are healthy, substantial animals that would make attractive targets for hungry hunters.

Although neither fetuses nor newborn bison are known for high fat content, they make up for this by being tasty. Unlike tough, older animals, their flesh is soft and succulent. As Samuel Hearne noted in 1772, fetal bison were a highly esteemed treat, and "the young calves, cut out of their mothers' bellies, are reckoned a great delicacy indeed." Lewis and Clark exclaimed that young calves "are equal in flavour to the most delicious veal." And if you were eating a fetus, you were also probably dining on the mother, which offered a more complete array of nutrition than the low-fat fetus.

## Mothers

*The principal beast of chase is the buffalo, or, rather, the buffalo cow.*  
– Maximilian, Prince of Wied, 1832–34

In the renewed life of spring on the Plains, many, though not all, healthy adult cows will be carrying young. On average about three-quarters of the adult females will be pregnant in any given year. Cows dropping their calves in spring are embarking on their most perilous journey. Nursing the young over the coming months is a wasting,

## *Imagining Head-Smashed-In*



*Cows typically weigh between 450 and 650 kilograms, and are able to reproduce from about the age of two until they are fourteen. (Courtesy Johane Janelle)*

depleting experience for the mothers (as in cattle, single birth is the strong norm and twins are very rare). The continuous production of milk depletes the body resources of the cows. Mothers can routinely lose most of their body fat and even some of their muscle tissue during months of nursing. You can see another critical aspect to timing of birth – the mothers, just like the newborn, need the fine graze of spring and early summer to get them through their own period of greatest stress.

Traditionally, it has been thought that pregnancy was a draining experience, that cows carrying calves are under considerable physiological stress associated with nurturing the fetus. This is only partially correct. Pregnant cows tend to be the biggest, fattest, most muscular of all females, and they stay this way through most of their pregnancy. The simple story is that nature has worked out that big body size is good for reproduction. You may have heard stories of peak female athletes being unable to conceive. Some stop having their menstrual period entirely. They have shed all their body fat, and nature has deemed them, temporarily, unfit to carry a fetus. Fat, despite its current bad rap, is essential to life. Especially lean mothers at the time of conception have little chance of providing essential nutrients to the fetus. The fetus may not make it to full term or, worse, it will, and the mother will be unable to feed the newborn calf.

Over millions of years of evolution, Nature has given her priority to the mother, not the calf. The death of a calf, or failure to conceive, is the loss of one animal. Survival for the mother means the potential birth of many more calves in the future when the cow's condition improves. Lean, scrawny cows that become pregnant risk draining all their own resources to nurture the calf, and neither may survive. Fat, heavy cows have the reserves necessary to ensure the survival of the calf and, more importantly, of the mother to breed again another day.<sup>†</sup>

Cows need to be seen as two distinct groups based on reproduction: those that are pregnant and those that are not (that is, barren). When the cows have just dropped their calves in spring, the production of milk kicks in and the nursing mothers become extremely lean, in fact the leanest they will be all year, as they pour all their resources into nursing the calf. Although nursing continues for many months, the effects on the cows are most severe in the first few months and then quickly taper off.

Through the summer, calves start adding grass and water to their diet. The calves depend less on mothers' milk, and the cows, too, eat fine quality spring and summer graze to help them regain weight. By late summer most cows have recovered from the debilitating effects of lactation, only now they are faced with another rut. Those that have recovered the most, and put on the most fat, will likely breed and become pregnant for a second year in a row. Some that have recovered less well, perhaps having dropped their calves a little later in the spring or faced poor summer graze, may be so lean during the rut that nature blocks their becoming pregnant that year. These cows are now out of the reproductive cycle for that year (barren) and are free to focus on building up their own body resources over late summer and fall.

As the cows enter the fall and winter, the barren cows are leaner. The pregnant ones are by definition fatter, as it was their greater fat stores that allowed them to become pregnant. Both groups generally gain weight (mostly fat) through autumn, since grasses on the northern Plains tend to experience a second pulse of growth and remain highly nutritious. Autumn is the season when cows will have more fat than at any other time of the year. This is true for both pregnant and barren cows, though the former will be the fatter. Cow hides are also in prime condition at this time: the skin is thick and free of the insect holes that come with summer; the hair (much of which is shed

<sup>†</sup> There is, of course, an upper limit to fat being a good thing, as when cows on bison ranches are overfed to fetch a better price at auction. Their fat can close off the birth canal, resulting in a difficult delivery (sometimes death) for both mother and calf. In the wild, this is unlikely to happen.

in summer) has grown back bushy and full. Cows simply don't get any better than they are in autumn.

With the onset of winter, the grass freezes, dries, lays flat on the ground, and loses a great deal of its protein. Snow covers much of the land. Bison, unlike cattle, are extremely efficient winter grazers, using their massive heads to sweep the ground clear of snow. But much more energy must be expended in this effort, with a reduced nutrient return from the dead grass, and all bison lose weight. Fat goes first, as the animals draw on their own stored reserves to compensate for poor feed. In a really severe winter, fat may be severely depleted and muscle, and even bone tissue, may be called on to support life. The weight of adult cows may decline as much as fifty to seventy-five kilograms over winter (about 10–15 per cent of body weight), most of which is fat. As winter deepens, all cows are becoming lean, but the pregnant ones are still the fattest. Remember that they started off in autumn as the fattest of the cows, and for most of the gestation period the fetus draws on little of the mother's reserves, so the pregnant cows remain fatter than the barren ones throughout the winter.

As the next spring approaches, the situation begins to change dramatically. The last months of pregnancy finally start to make a substantial impact on the mother's body resources. Fat, already depleted from winter stress, is now drawn on to nurture the rapidly growing fetus. Barren cows don't experience this late winter-accelerated fat drain. Although all cows are lean in late winter, the barren ones may now start to rival the pregnant cows as being the fatter of the two groups. With the appearance of the first green grass the disparity between the two cow groups intensifies. Barren cows begin to replenish fat and rapidly gain weight. Pregnant cows drop their young, begin lactating, and sink into the depths of fat depletion, ameliorated only by the fact that grass is once again nutritious.

So for those few months of spring and early summer, say from March or April through June, the cows that did not calve become the fatter of the cow groups, while those nursing are in terrible shape, with almost no body fat. The barren cows will gain a great amount of summer weight, mostly fat, and be in prime shape to breed and become pregnant during the coming rut. Nursing cows will start to improve through summer, some enough to breed again, others will be spared by low fat levels and remain barren for the coming year. And so the cycle begins again.

## Fathers

*Bull meat is not regarded, it is seldom fat, and always tough.* – David Thompson, 1784–1812

*Small openings are left [in the buffalo pounds] to admit the dogs to feed upon the carcasses of the bulls, which are generally left as useless.* – Alexander Henry, 1808

The situation for males is almost entirely different. Nature has conspired to have cows at peak fat levels as they begin their journey on the road to bearing young, that is, in the fall. Nature has also conspired to have males achieve maximum fat levels according to the need to engage in reproductive activity, but for them this season is late summer. As with females, males are more likely to breed if they are big, fat, and heavy. These will be the dominant males, those that butt others out of their way, sometimes engaging in fierce battles, to take control of cows that are in estrus. Not only are they strong enough to dominate smaller males, there is also evidence that females find the bigger males attractive, apparently recognizing that pairing up with a big male will more likely lead to the production of a strong, healthy calf that will become a competitive son.

Young males will stay with their mothers through the first two or three years of life, after which they wander off to join the bull groups. In fact, young bulls look like cows for the first three years of life, but by the summer of their third year they grow a hair coat that defines the males and, after the rut, they leave the cow-calf herd. They remain very junior in the bull groups for several more years, as they continue to increase body size, and only start to flirt with the prospect of sexual activity at about five or six. As you would expect, adult males reach peak physical size and condition (including body fat) in mid- to late summer to coincide with the rutting season, as this will increase their chances of attracting cows. And then an amazing thing happens. They lose a large proportion of their body fat just as cold weather is approaching.

Wildlife biologists used to think that the primary purpose of body fat in large game animals was to serve as a reserve energy source to help the animal survive the rigors of winter. While there is still some truth in this belief, the emphasis has shifted to recognizing the profound role fat plays in reproduction. Nowhere is this seen more vividly

## *Imagining Head-Smashed-In*



*This bull is in prime condition and thus fit for breeding. Adult males weigh between 650 and 900 kilograms. (Courtesy Johane Janelle)*

than in the fact that males of many North American large mammals experience a drastic crash of their fat stores shortly before the onset of winter. How can the main purpose of fat be that of a winter energy reserve when most of it is lost in the time leading up to the most demanding season of the year? It has become increasingly clear that the primary role of fat is to allow males to participate in reproductive activity. Big, fat, heavy animals have a greater chance to reproduce; skinny, lightweight males are likely to be left out of the game.

In this sense males are more expendable than females. Fat cycles in cows clearly favour survival of the mother, so that a normal cow can breed a dozen times or more during her life. Continuation of the species, then, is better assured by having the cow survive, even at the expense of the calf. For males, however, the emphasis is on doing everything possible to take part in the reproductive effort. If some of them don't make it past this point and perish over winter due to depleted body reserves, there is minimal danger to the overall survival of the species, because relatively few healthy males can (and do) impregnate many cows. Having many cows in a herd is an advantage, as they produce the young that perpetuate the species. It is less critical that

a great number of males survive, since a lower number will still be enough to impregnate all the females. No doubt these facts play a role in adult male bison losing most of their fat reserves before heading into winter.

Males come through the long winter on the Plains pretty scrawny, but they soon begin to fatten on the fresh grass of spring. Since they have nothing like the drain of lactation to get in the way, they just keep putting on fat and muscle through the summer and are in peak shape at the start of the rut. But rutting does strange things to male bison (the same could be said of our own species). They become obsessed with finding and guarding cows for mating. They stand by them constantly, ever watchful for other bulls that might have eyes for their cows. This requires vigilance and attention, full time. They will stop eating for days and weeks, as having a head down means taking one's eye off the cows and the other males. They seldom sleep. They pace and chase other males away. They fight. All this extra activity burns calories, lots of them, and yet by fasting they take in almost no new sources of energy to keep up their body tissue. Their fat levels crash. By the end of the rut, adult males lose a great deal of total body fat and even some muscle tissue. But it's all for the cause: the powerful instinct to engage in reproduction. Take a bull completely away from the herd, isolate him in a pen by himself, and he will behave exactly the same and suffer the same physiological changes.

Another thing happens to bulls at this time that affects our story. The rut triggers a rush of hormones pumping through their bodies, and these hormones affect the taste of their meat dramatically. Modern-day hunters of big game are all too familiar with this. They know it is pointless to shoot a bull animal during the rutting season (unless you are only after a trophy), because you won't be able to eat any of the meat. While the musky flavour wouldn't kill you, it sure doesn't taste good. There are plenty of historical accounts of fur traders and explorers who simply had to kill a bull during the rut. They ate it and it kept them alive.<sup>†</sup> But they didn't like it, and they tossed the meat as soon as there was a chance of something else, preferably a barren cow or a bull too young to be part of breeding activity. You can imagine that for a culture subsisting primarily on the flesh of wild animals, it was a dark day indeed when they were forced to take down a bull during the rut. They did so very reluctantly, and only when survival depended on it.

<sup>†</sup> Hunting during the rutting season of August 1843, John Audubon and his entourage came across six bull bison. He commented, "Our folks have shot buffaloes, but I have not done so, simply because they are worthless through poverty, and when killed only display a mass of bones and skin, with a very thin portion of flesh; and if you shoot a bull the rankness of its better parts is quite enough to revolt the stomach of all but starving men."

## The Big Picture

Which of the two sexes is the fattest at any time of the year is a complex issue, requiring comparison of three groups: cows that are reproducing, cows that aren't, and bulls. It is likewise apparent that if your goal is to hunt the fattest buffalo, different sexes and groups of animals will fill this need at differing times of the year. All adult cows are probably fatter than adult males during the fall and winter. Breeding bulls have lost most of their body fat in the rut, nursing cows have pretty much finished lactating, and non-nursing cows are probably fattest of all and almost certainly have become pregnant. By the end of winter all bison have suffered declining body reserves. Because cows had much more fat than breeding bulls to begin the winter, however, they are still in better shape. By spring the barren cows and bulls rapidly replenish lost fat, but pregnant cows drop their calves and begin nursing. The former two groups will be about equal in fat at this time, while the lactating cows are wholly unacceptable as food. This situation continues into the early summer, at which point the bulls start to gain on the barren cows. Bulls are the fattest animals through mid-summer and at the onset of the rut. But as the rut progresses, bull flesh becomes more strongly infused with musky-tasting hormones. Bulls begin to lose their fat, while at the same time all cows are improving and are soon again the fattest bison.

Adult cows are the fatter of the two sexes for a good part of a typical year. This is true from at least September through April or

*Bison are highly sexually dimorphic mammals, which means that males are substantially bigger than females. (Courtesy Wes Olson)*



May. Bulls are almost certainly fatter than any cows in mid-summer, from June through August, although by the latter month the effects of the rut are beginning to taint their meat. Recalling that Aboriginal hunters desperately wanted and needed to kill the fattest animals, maximizing fat means killing mostly cows for much of the year. Only in early to mid-summer would bulls be the preferred target. And the difference in fat content isn't just one of relative abundance. Wouldn't it be reasonable to conclude, therefore, that killing a male bison, even if the animal is relatively leaner, would still yield a greater amount of fat simply because male bison are substantially larger than females? It's a good question and the answer is surprising.

Bison are what's termed *sexually dimorphic*. It means that the males are consistently bigger, heavier, and more muscular than the females. The same is true of most large mammals, including humans.<sup>†</sup> And the difference is significant. Male bison are, on average, about 30–40 per cent bigger and heavier than cows. This translates into an advantage of several hundred kilograms of body weight in favour of the males. Accordingly, you might expect that the absolute weight of fat on a bull would exceed that of a cow, even though the cow might have a greater percentage of fat as total body weight. If this were true, then it would make more sense to kill bulls all the time, simply because their much greater size would translate into greater fat weight. Such is not the case; at least not with respect to fat. It is true with respect to muscle tissue (meat). Males are far more muscular than cows, and their muscle mass far outweighs that of the cows, regardless of the season. If your goal was to obtain the most meat you could get from a kill then you would always shoot for the bulls.

However, fat, not meat, was the food source most sought after by all Plains Aboriginal hunting cultures. Despite their smaller size, cows have a greater absolute weight of fat than males do, for most of the year. This is a characteristic of females in many species (again including our own); reproduction requires greater fat reserves for energy, and since the females have to carry and nurse the young, they are genetically disposed to have greater fat reserves. The important lesson here is that different groups of bison differ dramatically in what they offer human consumers by such factors as sex, season, and reproductive status. Aboriginal bison hunters learned this lesson thousands of years ago.

<sup>†</sup> Curiously, and for reasons still debated, some species of birds show the opposite trend.

## Science and the Historic Record

The foregoing summary generally accounts for what science teaches us about the differing condition and habits of bison on a seasonal basis. The field of study is called *bioenergetics*; the dynamic processes that operate in the animal body in response to growth, development, and the biological imperatives of reproduction and survival. It is one of the most fascinating areas of literature that I ever delved into, as it helps explain so much of the behaviour we see today in so many species (yes, again including our own). But is it relevant to the real world of everyday hunters and gatherers, those people slogging it out a few thousand years ago just trying to kill some game and provide the next meal? They could not have known of these complex biological processes, but did they appreciate their effects?

Native hunters were keenly aware of these differing conditions and exploited them to ensure procurement of the fattest possible animals at any given kill. European explorers to the Plains soon learned the same biological truths that Native people already knew. Often they learned them from the Aboriginal guides and scouts employed to take them across the Plains. Sometimes they learned these facts on their own, from trial and error, like the famous artist George Catlin in 1832 when he shot his first bison – the biggest, oldest bull he could find. Assuming that bigger was better, he aimed for a massive bull and suffered ridicule and laughter from the rest of his party “for having aimed at an old bull, whose flesh was not suitable for food.” Just how much of the intricacies of bison bioenergetics did buffalo hunters really know?

Because no Aboriginal groups of the Great Plains ever developed a system of writing, there always will be some uncertainty regarding what they did and why they did it. True, there are still the memories and voices of the elders. Fortunately, there has been a great upsurge in attempts to document and record the knowledge of the elders before they pass on. But much of this information remains on dusty cassette tapes sequestered in archival storage or in the hands of various Aboriginal cultural centres and museums. Little has been published, and the little that has deals specifically with the finer nuances of buffalo hunting.

Fortunately, there is another source we can turn to: the wealth of literature left behind by the many European explorers, map-makers,



fur traders, missionaries, and adventurers who traversed the Great Plains in the time when bison hunting was still being practised by Native groups. Not only did these people directly observe Native people hunting buffalo, virtually all of them came to depend for their own survival on procuring the great beasts of the prairies.

To be sure, many of these observers were heavily biased against the ways of Aboriginal people; they constantly judged and evaluated these startlingly different cultures by the standards of European civilization. Not unexpectedly, Native culture tended to fare poorly in such comparisons. T.J. Farnham, in 1839, felt compelled to ride around a village of Kansa people asking them if they were humans or beasts. Henry Brackenridge, in 1811, after observing what he assessed to be the filthy, squalid living conditions of the Natives of the Plains said, "The lovers of Indian manners, and mode of living, should contemplate them at a distance ... the world would loose but little, if these people should disappear before civilized communities." Henry Youle Hind's account from western Canada in the 1850s referred to the Native inhabitants as "savage, untutored, and heathen."

In contrast, David Thompson, one of the world's greatest explorers and map-makers, spent three decades with Native people of the

*Perhaps reflecting the artist's own encounter with a huge bull, George Catlin painted this scene of an Aboriginal hunter bringing down a great bull, shown out of proportion to the horse and rider. (Courtesy Bruce Peel Special Collections Library, University of Alberta)*

West and found much to celebrate in Native culture. He found them to be “brave, steady and deliberate,” and praised their sharing of food. Stinginess, Thompson said, “is more detested by them, than by us, from their precarious manner of life, requiring assistance from each other.” The sick and aged, he observed, are always well supplied. In contrast to Brackenridge’s complaint of Indians as foul smelling, the explorer Edwin James, in 1819–20, reported that Natives were exceedingly pleasant to be around but that the “Indians find the odour of a white man extremely offensive.” Further, James reports that bison, too, seemed to find the smell of the white man especially odious and that Natives complained how the smell of Europeans never failed to drive bison from the region. He offered an insightful second reason for the bison’s aversion to Europeans: “We are aware that another cause may be found for this than the frightful scent of the white man, which is, the impolitic exterminating war which he wages against all unsubdued animals within his reach.”

Travelling among the Métis buffalo hunters of the Red River region of Manitoba in the late eighteenth century, Alexander Ross fully intended to disparage the “barbarians” with the following observation, but he may have, in light of modern values, paid them a backhanded compliment:

*These people are all politicians, but of a peculiar creed, favouring a barbarous state of society and self-will; for they cordially detest all the laws and restraints of civilized life, believing all men were born to be free. In their own estimation they are all great men, and wonderfully wise; and so long as they wander about on these wild and lawless expeditions, they will never become a thoroughly civilized people, nor orderly subjects in a civilized community. Feeling their own strength, from being constantly armed, and free from control, they despise all others; but above all, they are marvellously tenacious of their own original habits. They cherish freedom as they cherish life. The writer in vain rebuked them for this state of things, and endeavoured to turn the current of their thoughts into a civilized channel. They are all republicans in principle, and a licentious freedom is their besetting sin.*

An alternative view of the value of civilization to the North American Indian is offered by the missionary P.J. De Smet, who traversed the western states and provinces in 1845–46:

*Many years have been passed in debates and useless contention, without one single practical effort to secure his real or pretended rights. The poor Indians*

*of Oregon, who alone have a right to the country, are not consulted. Their future destiny will be, undoubtedly, like that of so many other unfortunate tribes, who, after having lived peaceably by hunting and fishing, during several generations, will finally disappear, victims of vice and malady, under the rapacious influence of modern civilization.*

As you would expect, there are as many opinions as there were Europeans to provide them. Many of these people were simply trying to sell copies of their books and journals to audiences back home thirsty for vicarious adventure, and so they indulged in bombastic descriptions of buffalo hunts.<sup>†</sup> But in one respect the records of the Europeans left little room for prejudices; when it came to buffalo hunting, virtually all of the Europeans were newcomers to the Plains, rookies in the truest sense. Whatever they thought of Aboriginal people in other respects, they could not but help marvel at the astounding skill and ingenuity of the Plains hunters at bringing down bison. In the 1830s Josiah Gregg proclaimed that Natives were “remarkably expert” with the bow and arrow, “with an accuracy nearly equal to the rifle.”

As quickly as they could, Europeans tried to emulate Native tactics and skills at bison hunting, for it now spelled the difference between death and survival for themselves.

Here are the comments from early European visitors arranged by the months of the year to match the bioenergetic processes:

#### JANUARY

*Wounding a bull, which I left for the present ... I pursued after another uncommonly fine fat cow.* – Capt. John Palliser, 1847–48

#### FEBRUARY

*Killed three buffalo; they are getting very lean.* – Alexander Henry, 1801

*[The buffalo are] too poor to be worth hunting.* – Lewis and Clark, 1804–06

#### MARCH

*[Natives] had killed two poor Bulls, of which we were glad to get a part.* – David Thompson, 1784–1812

*[Killed] a fine fat cow.* – Josiah Gregg, 1837–38

<sup>†</sup> The Earl of Southesk described the eyes of a bison he had just shot as “emerald furnaces ... that glared with this remarkable expression of intense, everlasting hatred.” Edward Harris likewise described a wounded buffalo: “His appearance was now one to inspire terror.”

*Imagining Head-Smashed-In*

APRIL

*[The buffalo are] so weak that if they lie down they cannot rise. – Alexander Henry, 1810*

*We intended] if possible, to pick out a barren cow, as they afford the choicest meat at this time of year. – Capt. John Palliser, 1847–48*

MAY

*Killed a tolerably fat young bull. – Alexander Henry, 1801*

*I got alongside of the cows; but they were so thin and miserable, being most of them in calf ... At last I spied a barren cow that seemed to promise good meat ... She was in wonderful condition. – Capt. John Palliser, 1847–48*

JUNE

*In June the bulls are fat and in fine condition while the cows from the tendance of their young through the winter are still poor. – Lewis H. Morgan, 1859–62*

*[Shot a] well-larded body of a noble bull. – James Farnham, 1839*

*At this time of the year, in the early part of June, the cows are not fit to kill; for they have their young calves, and are very poor. – Charles Larpenteur, 1833–72*

JULY

*We killed a bull, the flesh of which is more palatable at this season than the cow; bulls are beginning to get in good order ... cows are wretchedly lean and will continue so until the latter end of the month. – Alexander Henry, 1801–09*

*In the month of July when the Bison Bulls are getting fat. – David Thompson, 1784–1812*

AUGUST

*Saw ... six bulls ... They are poor at this season, and the meat very rank, but yet are fresh meat; Saw Buffaloes ... on approaching them found only bulls; so returned empty-handed to the boat. – John Audubon, n.d.*

*A bison ... was killed; but the flesh was found in too ill a condition to be eaten, as is the case with all the bulls at this season. – Edwin James, 1820*

*The Cows were fat and excellent meat. The younger Bulls kept near the cows,*

*and were in tolerable order, but the old Bulls fed separate, poor and ferocious.*  
– David Thompson, 1784–1812

#### SEPTEMBER

*I killed a Bull Buffalo, nothing but skin and bone; took out his tongue, and left his remains to the Wolves ...* – Anthony Henday, 1754

*I found them only a band of six bulls, which are not good for much at this season. I shot one, but the meat was not worth embarking; Each of us soon killed a good fat cow.* – Alexander Henry, 1808

*I returned at sunset, having shot a fat cow, the choice pieces of which I brought in. I also killed four bulls, only the tongues of which I took.* – Alexander Henry, 1800

#### OCTOBER

*Two old out-straggling bulls [seen] ... We allowed them to go unmolested, as ... we were in hopes that, by waiting a little, we might come across some cows, which would prove a much greater prize to us.* – Capt. John Palliser, 1847–48

#### NOVEMBER

*Saw a few Bull Buffalo ... but did not kill any of them.* – Peter Fidler 1792–94

#### DECEMBER

*Men running buffalo & killed upwards of 20 fatt Cows.* – Peter Fidler, 1792–93

*My people killed three bulls ... which served for our dogs.* – Alexander Henry, 1800

*Bull flesh is not desirable at this season of the year, when the female can be procured.* – Paul Kane, 1845

*Killed four Bulls, no Cows in sight. We have now plenty to eat, but very tough meat, so much so, we get fairly tired eating before we can get a belly full.* – David Thompson, 1784–1812

Month by month there is remarkable correspondence between the preference for, and avoidance of, specific bison and of the known processes of bioenergetics that dictate the different conditions of bison throughout the year. One insurmountable fact tells us that Aboriginal

bison hunters knew and manipulated these facets of buffalo biology – for twelve thousand years Native people survived and, even, flourished living off the buffalo of the Great Plains.

## The Seasonal Round

Anthropologists use the term *seasonal round* to describe the cyclic and repetitive patterns of movement over a landscape according to the different seasons. It can be used for people or for animals, such as bison. As it happens, the seasonal round for the Aboriginal groups that lived for thousands of years on the Plains and for the herds of bison on which they subsisted share some striking similarities. Since the people depended so heavily on bison, it is not surprising that the seasonal movements of the former roughly paralleled the latter. One of the most common questions I have been asked over the years is, what season of the year did people plan and orchestrate the great communal buffalo hunts? I think a lot of people expect the answer to be that it was used whenever people were lucky enough to find a herd of bison just in the right place behind the cliff. The implication is that the human hunters were not in control of this situation but, rather, were passive observers waiting for nature to smile on them with a fortunate alignment of all the necessary ingredients of a jump. Nothing could be further from the truth. Native groups *orchestrated* every aspect of a communal bison kill, including choosing the seasons in which they were held. To answer the question of what time of year the great jumps were conducted requires consideration of bison behaviour and movement over the course of the year.

Everyone knows bison are synonymous with the Great Plains. And those who aren't familiar with the true character of the Plains think of them as one massive expanse of flatland stretching from the middle of the continent to the Rocky Mountains. But the Plains are in fact much more complex and convoluted. They include great sets of hills, like the Sweet Grass, Cypress, and Black Hills. They include the valleys of deeply incised rivers, creeks, and coulees – broad valleys carved by the water from melting glaciers, many of them dry today. They include patches of evergreen and deciduous forests, which have taken root in local sheltered areas protected from the winds and blessed with a little extra water. And they include an abundance of shrubs and bush growing in the lee of slopes, at the

site of groundwater seeps, and in the valleys. The Plains habitat on a gross scale seems monotonous, but on a micro scale it is packed full of diversity. Bison are indeed a creature of the Plains, in all its varied components.

*Summer:* Summer is perhaps the stereotypical season of the buffalo. As shown in books and movies, teeming herds of them covered the prairie as far as the eye could see. While you couldn't count on this sight every day from every location, it is quite true that summer was the season of the great aggregation of herds on the Plains. Summer is the season when calves are dependent on their mothers and when safety from predators rests in large numbers. Likewise, nursing cows, who are weak and tied to their calves, need the protection of a large herd. Summer is the season when bulls want the company of the cows, to begin courting those they hope to include in their harem. Most importantly, summer is the season when grass is abundant and relatively nutritious, capable of supporting large herds in relatively small spaces. Many of the groups of bison dispersed for much of the year came together in the summer, because the grass growth permitted it, and because preparation for courtship and mating required it. What the movies didn't show was that summer was the only season in which massive herds blackened the Plains.

Huge herds, numbering many thousands of animals, formed on the prairies for summer grazing and for the rut. The aggregation of such large numbers might suggest summer as the ideal time for mass communal hunts by Aboriginal people. For a number of reasons, however, such was not the case. A good percentage of the cows, probably more than half, are nursing calves and are thus badly depleted in fat stores and thus unsuitable as food. Furthermore, nursing cows will not run hard for any length of time because their young calves can't keep up with them. A good, strong run is required for a jump to work. Cows without calves are indeed fine food in summer, and would run without the hindrance of a calf, but they are mixed in with other cows, calves, and bulls and (unless you have horses) would be difficult to single out for selective killing. Bulls are good eating in early and mid-summer, but as we know, their meat becomes unacceptable during the rut and, more significantly, their behaviour becomes unpredictable. Bulls become obsessed with mating, not survival, and will stand and fight rather than run. A summer attempt at running a mixed bison herd towards a cliff would likely be a mess. Nursing cows would only run

short distances and stop because their calves were not running with them; non-nursing cows would run like the wind, and adult bulls could stand and defy you, or scatter.

Summer is a unique time in the seasonal round of the bison, when herds of cows and bulls amass in great concentrations. For the remaining three seasons of the year these huge herds disperse, and two basic social groups develop. First, there are the cow–calf groups, which consist of cows (both pregnant and not), calves, and one- and two-year-olds of both sexes. By about the age of three, males begin to drift off, preferring the company of other bulls. Because cows are the more social of the two sexes, they choose to stay in larger groups, typically numbering between one and two hundred. Then there are the bull groups. Bison bulls are relatively solitary animals, increasingly so with age. Following the rut, bulls will wander off, often in groups of one, two, five, or ten. They will stay like this for the remainder of the year, occasionally joined by a few juvenile males and sometimes meeting up with other bull groups. This basic division of the sexes persists until the following summer when the herds once again seek each other's company.

*Fall and winter:* The huge herds of summer didn't simply disperse and stay out on the great, expansive Plains for the entire year. Bison move a considerable distance over an average year. Some anthropologists have said that, in the past, bison were truly migratory, with great numbers heading south in winter and back north in summer. Others have claimed that migrations were more local in nature and not necessarily directed north–south. We do know this: great numbers of bison overwintered on the northern Plains – just not on the flat and exposed windswept prairies. We know this from Native elders, from numerous historical accounts made by early explorers, and from the many bison kill sites used in the winter season.

Following the rut, the great herds dispersed into smaller bull and cow–calf groups. As long as the forage on the Plains remained fine, and the weather fair, bison stayed out on the open Plains for another month or two. As the air turned crisp and ice began to form on the edges of ponds and streams, their instinct told them that it was time to head for sheltered areas. Seeking shelter during winter on the Plains is a common theme to almost every form of life living there, whether it amounts to burrowing underground, hiding amongst groves of trees, or vacating the Plains entirely.



Bison are incredibly hardy animals and extremely well adapted to cold. They have extraordinarily thick coats of hair for insulation and hides that can be several centimetres thick at certain times of the year. Even so, winter is a brutal time in open northern country. It's not just the temperature, which often dips below  $-30^{\circ}\text{C}$  ( $-22^{\circ}\text{F}$ ) and occasionally much lower; it's the wind. A moderately cool day becomes bitterly cold when whipped by a strong wind. For anything alive that is in the open and exposed, a cold, windy day is utterly unbearable. The only relief is to get out of it.

This is just what bison, and the hunters who depended on them, did. John Palliser, near Morley in 1847–48, made the observation, “the buffalo in winter approach the edge of the woods, and so also do the Indians, seeking fuel and thickwood animals, in case of the buffalo failing them during the winter.” As winter set in, both the cow-calf groups and the small bull clusters struck out for places they knew would offer protective shelter. These areas weren't necessarily any warmer or less snow-covered, but they all had one thing in common – they provided refuge from the wind. Typical winter sheltering spots for bison included deep valleys of rivers, creeks, and coulees, thick groves of trees and brush, and hilly or broken country where there are options to move out of the wind. Since these are all local features on the landscape, not huge single areas, it meant that herds had to

*As winter approaches, bison herds begin to vacate the open plains and head for sheltered valleys where tree cover offers protection. (Courtesy Mary Meagher, U.S. National Parks Service)*

## *Imagining Head-Smashed-In*



*Although winter could be a brutal time on the Plains, bison are exceptionally hardy animals and smart enough to use vegetation cover to ease the fury of winter storms. (Courtesy Johane Janelle)*

break up into small groups. The need to scatter was also dictated by the poor quality and reduced quantity of forage at this time of year, which could not sustain large groups of animals. These shelter factors often combine; where you are out of the wind you also tend to find trees and shrubs, for they too require protection from the wind to grow, as well as the greater moisture provided by valleys and the lee sides of hills. In the dead of winter, the open, flat prairies were often barren of large animal life, except for the occasional movement to a new sheltered area or during warm spells when animals emerged to forage.

*Spring:* Sheltering from winter persisted through the toughest months, December through February. By March the grip of winter loosened and the Plains once again became a tolerant friend. Herds moved out of sheltered valleys and hilly country but stayed close enough to move back in case of all-too-common late winter storms. Sudden snowstorms frequently descended in April and May, but they lacked the bitter cold of winter and could usually be endured. Cows preferred to drop their calves in or near sheltered areas, and so they might linger longer into the spring in areas that afforded protection. But the bulls were on the move, heading for the new grass of the open Plains, and the cows were not far behind. Early summer again finds the herds beginning to coalesce, enjoying the greening-up of the prairie and the pleasure and safety of each other's company.

## The Season of Buffalo Jumping

*The Savages observe the Time, the Seasons, and the Moons of the Year very punctually, for the better ordering of their Hunting.* – Father Lewis Hennepin, 1680s

Head-Smashed-In Buffalo Jump was ideally suited to exploit the patterns of bison physiology and the seasonal round. It is situated in hilly, broken country – the Porcupine Hills. It is only a few kilometres from the major watercourse of the Oldman River and several local streams. Yet it is on the very edge of the expansive Plains. Looking east from the cliff there is nothing but Saskatchewan in your way (which is kind of like having North Dakota in your way). Trees and brush grow in the river and creek valleys and on sheltered sides of the hills. The grass cover of the massive basin area behind the jump is dominated by blue grama and rough fescue; both grasses provide excellent graze for fall and winter, as they are especially high in protein and they stay standing longer into the season (grasses that fall over rot more quickly and lose their nutrients).

Thus, Head-Smashed-In has abundant local water sources, broken, hilly country, intermittent tree cover for shelter, high-quality forage for grazing, and lies next to an immense expanse of prairie. Summer herds would be expected on the Plains east of the jump; fall, winter, and spring herds would find ideal topography and environment in the Porcupine Hills to the west. Quite simply, the jump sits at the confluence of several distinct landscapes and, as such, has the advantages of all of them. If you ask an ecologist what the best place for a species to reside would be, the usual answer is at the junction of several different environments to maximize opportunities for success and survival.

Bison could be expected to frequent the area around Head-Smashed-In in almost any season of the year. But the mere presence of bison in the proper place is insufficient reason to believe that jumps could take place at any time. The overview I have given of seasonal changes in body composition, and the formation and dissolution of social groups, discourages the idea that bison could be rounded up any time and brought to the brink of the cliff. By season, these are some of the issues that would have been considered by Aboriginal hunters:

*Spring:* Many cows would be calving and nursing and would be difficult to drive; they are also a poor food source. Cows without

*Imagining Head-Smashed-In*



*The prime buffalo country of the Porcupine Hills greens up dramatically in the spring to provide nutritious grass for the herds. (Courtesy Royal Alberta Museum)*

calves would be fine food but could not be driven easily when mixed with other cows. Bulls still live in groups too small for a mass drive. Bison are enjoying the rich green grass of the Plains.

*Summer:* The situation remains the same for cows with and without calves. Bulls are amassing in larger groups, but are more obstinate than cows and so will seldom run in a large, tight pack as is required for a communal kill. Attempting to round up and move bison during the late summer rut would be difficult because of behavioural patterns characteristic of that time. Most bison are living on the open Plains.

*Fall:* Cows with calves have largely recovered their body stores, and those without are in prime condition. Cows are separating from the bulls but remain in relatively large groups of a hundred or more. Bulls have depleted their body fat during the rut, are poor food, and are again drifting into smaller groups. Bison roam the Plains but begin to head for sheltered areas.

*Winter:* Early in winter cows remain in excellent condition and are still in sizable groups. By late winter they are becoming depleted of fat stores. Bulls in early winter are recovering from the rut, but later in

winter they are suffering, like the cows, from the effects of poor forage. Regardless of condition, bulls are in small groups unsuitable for deliberate driving. All bison reside primarily in sheltered regions.

From this summary, it is apparent that there was no good season for attempting a communal drive of bull bison. Their social groupings aren't really suitable for rounding up and moving large numbers, and their stubborn disposition would make this a difficult task. Furthermore, bull meat was regarded as tough, and as we have seen they are generally leaner than cows most of the year. Bulls were, of course, hunted occasionally for a variety of reasons including food, but most of this was solitary, not communal, hunting. When horses made winter hunting easier, the selection of bulls probably paralleled the observations of Josiah Gregg in 1837–38: "These [bulls] are generally selected for consumption in the winter and early spring, when the cows, unless barren, are apt to be poor; but during most of the year, the latter are the fattest and tenderest meat."

Communal driving of bison was pretty much restricted to cow-calf groups. It is these bison that for much of the year are found in groups of about the right size. Their protective instinct is to run rather than defy, they are the fattest of the two sexes most of the year, and the meat from cows was regarded as more delicate and tastier.

Two seasons stand out as most suitable to drive cow-calf groups: fall and winter. Their seasonal wandering would likely put them in and around the Porcupine Hills in these seasons. In both seasons, cow hides are thick and full and make the best robes and blankets for winter warmth. Holes burrowed by summer insects have healed. Fat levels for cows and juveniles are at their prime in both seasons (with the exception of late winter). Calves are now old enough to run with the mothers and so won't disrupt the drive attempts. But of the two seasons, fall stands out as the best of all. Not only are cows in the right place, of the right size groups, and at peak body condition in the fall, the weather is also most conducive. Trying to plan and operate a winter bison kill presents serious challenges to the hunters. As these events take days to prepare, the people have to contend with snow and cold and wind. If conditions turn bad it can be extremely demanding trying to round up, drive, kill, butcher, and process the remains of a major kill event.<sup>†</sup> Autumn still has plenty of pleasant days, and the cool nights help chill down the carcasses and slow down spoilage. Another obvious advantage of fall kills is that they allow you to put

<sup>†</sup> Butchering bison in mid-January 1841, Robert Rundle witnessed the physical agony of the process: "The cold was so severe at this time that the blood froze about the instrument employed in cutting up the animal. The person using it was obliged to soak it 2 or 3 times in the warm blood lodged in the carcass."

## Imagining Head-Smashed-In



*The buffalo jump in the fall offered pleasant camping, cool weather, herds in peak condition, and ideal circumstances for a communal kill. (Courtesy Royal Alberta Museum)*

away surplus meat and fat for the coming winter, when there will be days and weeks when hunts simply can't be conducted.

Since we know that fat animals were the key target of Aboriginal Plains hunters, there is another interesting slant to the importance of the fall season. While to us fat is just fat, in reality it isn't. Fat is composed of many things other than true chemical fat, such as water, ash, and other non-fat chemicals (especially the fat-soluble vitamins that are lacking in a diet with limited vegetables). We know that for large animals of the northern latitudes the relative amount of true chemical fat contained in fat tissue varies with the season. You guessed it: fat tissue has the greatest amount of true fat content in the fall of the year. The difference can be dramatic. For high Arctic reindeer, fat tissue can comprise as much as 90 per cent chemical fat in the fall and as little as 45 per cent in late winter. Thus, settling yourself down to a fine feast of fat from a late winter kill, only half of what you are eating might actually be fat. We don't know comparable figures for bison of the northern Plains, but we can be certain that they follow this pattern to some degree.

Autumn emerges as the finest season for hunting bison on the northern Plains, including in the vicinity of Head-Smashed-In. This

preference is generally confirmed in the writings of early European visitors. Daniel Harmon, early in the nineteenth century, wrote that game animals “are therefore killed, principally when they are the fattest, which most of them are in the fall, and some of them in the winter.” In the 1830s George Catlin said, “The Indians generally kill and dry meat enough in the fall, when it is fat and juicy, to last them through the winter.” And John Bradbury, on the Plains in 1811, stated, “I am informed by the hunters, that in autumn the quantity of tallow or fat in the buffalo is very great.” S.A. Barrett recognized the link between the great fall hunts and the need to store provisions for the coming winter: “the Indians had certain spots where the fixed winter camps were established in the fall of the year. At this season the buffalo were fat and prime and the drives to secure a winter’s food supply were usually held immediately after this fixed camp was established.”

But it would be a mistake to think that fall was the only season of this activity. Indeed, if we have learned anything about the ancient inhabitants of the Plains, it is that they were eminently and infinitely adaptable. Over the vast time they resided on the Plains, they obviously killed bison of all sexes and ages in all seasons. No doubt at times they simply had to, accepting that meat or hides might not be at their prime, or that social gatherings were not ideal, or that the weather was foreboding. Such is the nature of staying alive in a challenging world. At other times, they needed to kill animals for other reasons. The wonderful portable dwelling that Natives used for thousands of years, the tipi, was made of bison hides, and the spring and summer bison hides, much thinner than those of fall and winter, were preferred for making tipi covers. Over time many spring kills occurred, including some at Head-Smashed-In, no doubt dictated as much by the need to obtain suitable hides for tipi covers as for food.

Mass communal kills were not the only, or even the main, method of killing bison. Ancient hunters of the Plains killed bison singly, with a lone hunter skulking across the Plains, perhaps with a wolf skin draped over him. Groups of a few hunters from the same camp would head out for a day or two to scour the local area, hoping to return with the meat of a couple of animals. Sometimes five or ten animals would be killed, and the camp would move to the location of the slaughter rather than haul all the spoils to the camp. And every now and then the great communal kills were planned. How often these occurred we

*Imagining Head-Smashed-In*

don't really know. The archaeological record isn't that fine in detail. They may have occurred possibly once a year, some years maybe twice. At other times several years may have passed between mass kills if all the requisite parts didn't come together. When they did happen, they would have been something to behold.