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Tracking the Great Bear

My Track's Bigger Than Yours

By Jim Halfpenny, Ph.D.

My students and I were sitting in a bar in a small southeastern town in Alaska one night. It was the only place in town to get a meal after dark. Our conversation had shifted to the impressive plaster casts of bear tracks that we had made during the day, when the old timer came over to our table. He'd been eavesdropping on the conversation of the outsiders and was in dire need of local one-upmanship.

It was way up by the Great Divide (hmmm, the Great Divide, that's the Continental Divide, which is in Canada far to the east of our Alaskan location), that the bear almost took his life. The bear's track, the biggest he'd ever seen, was an impressive nine inches long.

It seems that wherever people gather and the conversation turns to bears, it is not long before it becomes a case of "mine's bigger than yours." My track is bigger than your track! My black bear is bigger than yours! (We did weigh a Riding Mountain National Park bear at 848 pounds without its paws and gall bladder which were poached.) My species is bigger than yours! Gary Brown in his book, *The Great Bear Almanac,* in the section titled "Bear Weights in Lore and Legend," does list the biggest bear, a Kamchatkan Brown, at 2,500 pounds. Being the natural skeptic I am, I wonder how a bear that big weighed such an even number and, do you really suppose the 2,500 pound bear was actually weighed?

Remember the words of the great naturalist, Adolph Murie, ". . . a bear a long distance from a scale always weighs the most." Many of the big bears, of course, were "sampled" by hunters which probably invokes the principle of hunting guide size-magnification for a paying client.

Back to the question, how big is nine inches? Fortunately, when recording tracks there are easy and accurate methods for preserving the size record. My favorite is the plaster cast, a trophy that preserves the truth and enhances both your coffee table and your legends, as few people have had the chance to marvel at the size of a bear footprint. Photographs are also good evidence, but they should be taken from directly above the footprint and contain a hard scale, preferably a ruler, but a knife or coin will work. Get as close as the camera will allow.

The old standby is to measure the footprint, but measurements must be done correctly. Towards the end of the Yellowstone grizzly wars between the National Park Service and bear ecologists Frank and John Craighead, a procedure was established for measuring bear tracks. None other than the prestigious National Academy of Science, while trying to shed light on the scientific controversy, declared that all bears would be identified by measuring their footprints.

So the field biologists started measuring tracks. Being astute observers, it did not take biologists long to realize that a grizzly emerging from a den in the granite rocky soil and walking down to the muddy lake became bigger the closer it came to the lake. Well, at least, its footprints became larger. A bear moving on a progressively softer surface will leave progressively larger tracks. What is the size of the animal's track?

Try this experiment. Place your hand on a hard surface, a table for instance. Feel the contact area of your hand with that surface. Imagine that contact area as your first contact with a mud surface. As your hand goes deeper into the mud, your handprint enlarges. An infinite number of track sizes could conceivably be

Figure 1

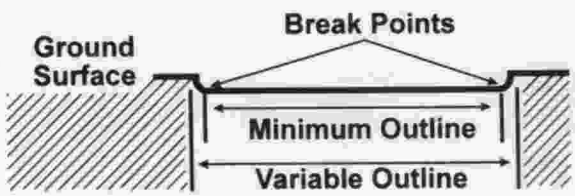
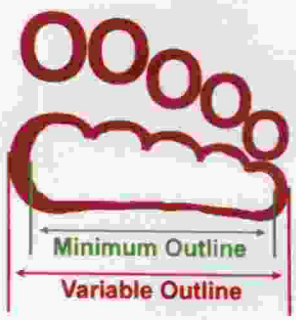


Figure 1. Cross-section of a footprint showing location of break points for determining the minimum outline of a track.

Figure 2. Generic bear footprint showing area exaggeration in red when variable outlines are used for measurements. The inside of foot pad lines represents the minimum outline and the outside of the lines represents the variable outline.

Figure 2



measured, depending on how deeply your hand settles into the mud.

Grizzly bear and mountain lion researchers recognized the problem of variable track size and tried to develop means of alleviating it. During their lion research, Fjelline and Mansfield (1989) developed a method for measuring tracks we now call the minimum outline method.

Remember the first contact area of your hand with the surface? If your hand went no deeper into that surface, your hand print would have only one size—the "minimum outline." If your hand sank deeper into the surface it would create a series of variable outlines as the mud flowed around the curved surface of your hand and fingers. All footprints have a minimum outline, but only prints that sink into a surface have variable outlines. Therefore, minimum outlines are the only constant and consistent size in tracking.

To measure the minimum outline, study the bottom of a footprint to determine where the rounded pad turns upward (see Figure 1). The break point where the pad turns upward would be the minimum outline edge. Use break points to measure tracks.

While the variable outline of a footprint may only be several millimeters wider than the minimum outline, those few millimeters have a large visual effect (see Figure 2). The human eye "sees" area and area increases with the square of a linear measurement. In short, a few millimeters of width and length add a lot of area to a footprint.

Minimum outline size does not change for different surfaces (assuming you have a clear track). This allows cross-surface comparison, for example, from snow to sand. While an animal may leave many "sizes of footprints" depending on surface, slope, and speed, there is only one minimum outline for every footprint.

Assigning the break point is a subjective judgment and no two people will always mark it at exactly the same point. However, experimentation has shown that an individual tracker can reduce personal variation in measurements and that groups of trackers trained in minimum outline methods will become more consistent in their measurement of tracks. Quality measurements are the tracker's goal and using minimum outline methods greatly reduces over-exaggeration and variability of track size measurement.

Whenever someone tells you they have measured an especially large track, determine if they understand the effect of sinking into a surface. Be very cautious of any measurements where the measurer does not specify that an effort has been made to control for the foot sinking into the surface.

In our classroom/museum at the house, we keep a reference collection

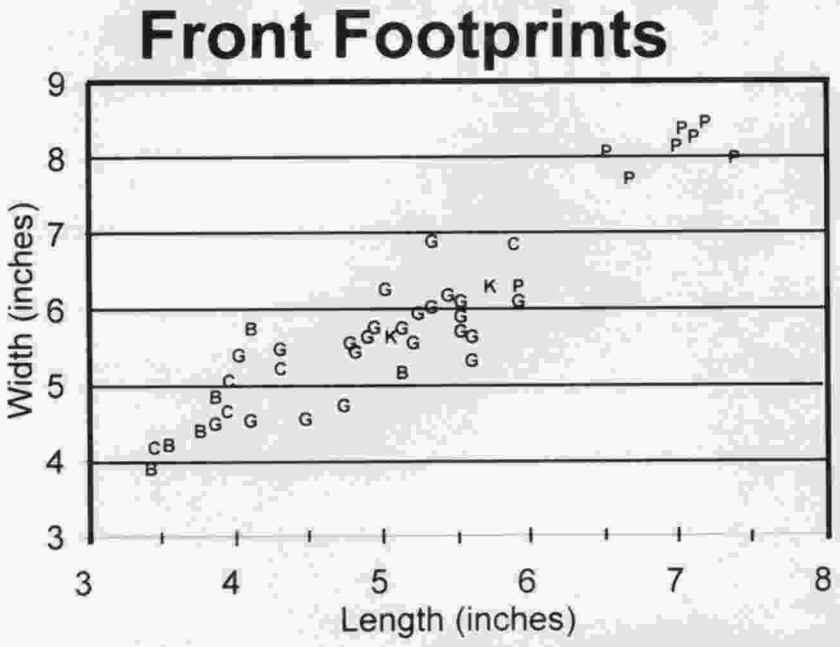


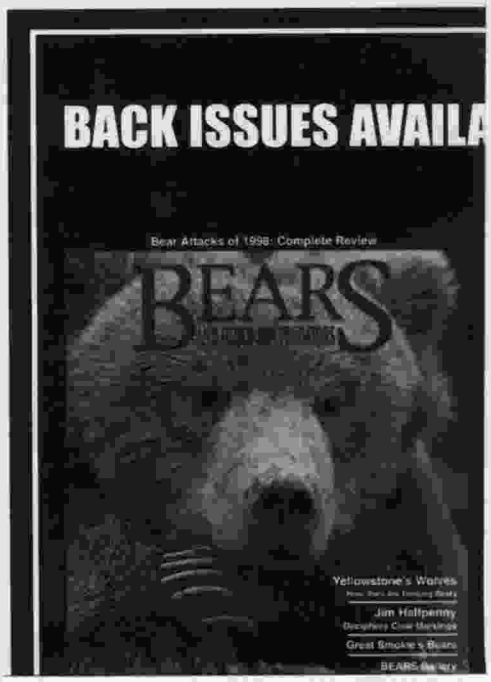
Figure 3. Minimum outline measurements of front footprints of varieties of bears. All animals are subadult or adult bears; neither cubs of the year nor yearlings have been included. Remember every bear was small once in its life and some never get big.
B = black bear
C = coastal brown bear
G = grizzly bear
K = Kodiak brown bear
P = Polar bear

of plaster casts of the different varieties of bears. For reference, I have included a graph of 52 selected minimum outline measurements (see Figure 3). This chart of front footprints should provide a guide to the size of tracks to expect for each variety of bear. Remember these are true track sizes—minimum outline measurements.

A parting thought, for my money the biggest bear is an angry mother of any species.

My special thanks to Jason Hicks, Susy Smith, and all who have helped track the great bears.

Jim Halfpenny and Diann Thompson snowshoeing by Yellowstone National Park's Old Faithful. Jim owns and operates A Naturalist's World in Gardiner, Montana. His books *Scats and Tracks of the Rocky Mountains* and *Scats and Tracks of the Pacific Coast* are available from Predator Press (see page 36).



Climate Change Threatens Polar Bears

The polar bears of Hudson Bay are thin and lean, the result of having to come ashore early in 1999. According to polar bear biologist Dr. Ian Stirling, for each week the bears come ashore early they are 22 pounds lighter in weight. This year, Hudson Bay warmed up early and ice melted three to five weeks ahead of schedule. That translates to a potential loss of up to 100 pounds per bear.

In most years, polar bears hunt seals on the pack ice from winter to early summer. When the ice melts, bears come ashore with a body weight that is about 40 percent fat. Stranded on shore until November, bears lose weight. A 1,500-pound male may drop to 900 pounds. Fat content will drop to as low as 12 percent—less than that is quickly fatal.

Less weight also translates to poorer survival, especially for cubs. Mothers who must go without eating for over six months while raising their cubs of the year simply don't have the fat reserves to nurse their young. Stirling says, "cubs compete at the nipple and the smallest ones have lower survival rates."

BEARS Field Editor Dr. James Halfpenny recently returned from Hudson Bay. He reports that it appears the Bay will be late freezing again this fall. If the freeze cycle continues in this manner, it won't be long before there are no polar bears left at the southern limits of their distribution at Hudson Bay. Only those bears in more northern climates may be able to survive.