

Bear Denning and Hibernation Behavior

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[...] indicates portion omitted from original

Hibernation is an adaptation to a seasonal shortage of food, low environmental temperatures, and snow cover on the ground (Craighead and Craighead 1972; Tietje and Ruff 1980). Bears hibernate during the winter months in most areas of the world. Duration of winter denning is dependent upon latitude and varies from a few days or weeks for black bears in Mexico to 6 months or more for bears in Alaska (Kolenosky and Strathearn 1987, Haroldson et al. 2002). The denning period in Yellowstone National Park is approximately 5 months.

For many years some people did not consider bears to be true hibernators. Mammals considered true, or deep hibernators, such as chipmunks and ground squirrels, experience a drastic decrease in body temperature during hibernation. Body temperature for hibernating bears remains above 88°F (31°C) which is within 12°F (11°C) of their normal body temperature of 100–101°F (37.7–38.3°C) (Bagget 1984). This allows bears to react to danger quicker than hibernators whose body temperature may be less than 40° F (4° C) and who have to warm up before they can move quickly (Bagget 1984). Many scientists now consider bears to be super hibernators. Due to the highly insulating pelts of bears and their lower surface area to mass ratio than smaller hibernators, body heat is lost slowly which enables bears to cut their metabolic rate by 50-60% (Craighead and Craighead 1972; Rogers 1981). Respirations in bears decrease from 6-10 breaths per minute normally, to 1 breath every 45 seconds during hibernation. They experience a drop in heart rate from 40-50 beats per minute during the summer to 8-19 beats per minute during hibernation. Mammals that experience lower body temperatures during hibernation, such as chipmunks and ground squirrels, must awaken every few days to raise their body temperature, move around, urinate, and eat (Rogers 1981). Grizzly bears and black bears generally do not eat, drink, defecate, or urinate during hibernation. Bears live off of a layer of fat built up during the summer and fall months prior to hibernation. [...]

It was once thought that bears ate roughage prior to den entrance to scour their digestive tract and form a plug in the anus to prevent them from eating any more food that fall. Actually, the plug, made up of feces, dead intestinal cells, hair, and bedding material, forms during hibernation and not before (Rogers 1981). [...] It is possible this plug may keep the bear from defecating inside the den during hibernation as fecal plugs are found just inside or outside the dens of bears that have just emerged (Rogers 1981). It was also once believed that bears obtained nutrients from sucking their paws during hibernation. This idea most likely arose from observations of bears licking the bottom of their paws during the last half of the denning period when their old, callused footpads slough off (Rogers 1977). The sucking and licking action apparently helps toughen the new footpads so bears can walk on them without pain or difficulty when they emerge from the den and begin searching for food (Beecham et al. 1983).

[...] Black bears tend to excavate dens, den under windfalls, in hollow trees or caves, and in previously occupied dens (Jonkel 1980). Grizzly bears tend to excavate dens at the base of large trees often on densely vegetated north-facing slopes. [...] Grizzly bears in YNP usually dig new dens but on occasion, dens (especially natural cavities) are re-utilized (Craighead and Craighead 1972; Judd et al. 1986; Miller 1990). Most dens are dug in sandy loam soils with some occurring in clay loam and rocky silt soils (Judd et al. 1986). Reuse of excavated dens is rare but does occasionally occur. Usually excavated dens collapse the spring after they are dug due to runoff and are unusable. Some grizzly bears excavate dens long before the onset of hibernation while other bears tend to wait to almost the last minute to construct dens (Craighead and Craighead 1972). Major den excavation is completed in 3-7 days during which a bear may move up to a ton of material (Brown 1993; Craighead and Craighead 1972). After completion of a den (which consists of an entrance, a short tunnel, and a chamber) bears will cover the chamber floor with bedding material ranging from spruce boughs to duff. The bedding material has many air pockets which trap body heat and form a microclimate around the bear helping to keep it warm (Craighead and Craighead 1972). [...] In most dens, the chamber is dug only slightly larger than the bear

allowing for efficient heat retention. However in some natural cavities used as dens, the chamber is much larger than the bear. Males and females with young usually dig the largest dens.

Movement to dens is correlated to weather and snow conditions with most movement usually occurring from late October to mid November (Judd et al. 1986). [...] Bears will remain in the area of their den for a few weeks and enter a state of lethargy during which they eat nothing and sleep frequently (Craighead and Craighead 1972). According to Craighead and Craighead (1972) and Servheen and Klaver (1983), final den entry occurs during severe snowstorms. In theory the fresh snow will hide any tracks or other evidence of where the bear's den is located. [...]

When temperatures warm up and food is available in the form of winter-killed ungulates or early spring vegetation, bears emerge from their dens. Male bears emerge first, usually from early to mid-March (average days denned = 131 days), followed by solitary females and females with yearlings or two-years olds (average days denned = 151 days) in late March through mid-April (Haroldson et al. 2002). The last to emerge are females with new-born cubs (average days denned = 171), from mid April through early May (Haroldson et al. 2002). Males, subadults, solitary females, and females with yearlings or two-year-olds usually leave the vicinity of their den within a week of emergence while females with new-born cubs remain in the general vicinity of the den for several more weeks (Lindzey and Meslow 1976, Haroldson et al. 2002).

[...] End of article

A few more facts about bears...

- ⇒ In the summer and fall leading up to hibernation, bears engage in extreme overeating (called hyperphagia) spending almost all of their time finding and consuming food (refer to slides for info on what a grizzly in Yellowstone eats). For example, brown bears have been known to eat up to 30,000 berries a day.
- ⇒ During hibernation bears do not consume water or food at all. Their bodies are able to recycle water that is given off in a number of chemical reactions inside their bodies. Very few other animals have this ability.
- ⇒ During the whole of the hibernation period bears do not poop or pee at all!
- ⇒ Bears lose hundreds of pounds during the months of hibernation. For example, a coastal brown bear in Alaska (known for their extreme weight gain) can enter hibernation weighing 1000 pounds and emerge weighing 700-850 pounds (having lost 15-30% of its body weight).

Literature Cited:

- Bagget, J. A. 1984. Hibernation. *Science World*. 40(10):8-11.
- Beecham, J. J., D. G. Reynolds, and M. G. Hornocker. 1983. Black bear denning activities and den characteristics in west-central Idaho. *Int. Conf. Bear Res. and Manage.* 5:70-86.
- Brown, G. 1993. *The Great bear almanac*. Lyons and Burford, publishers. New York, N.Y. pp. 146-155.
- Craighead, F. C., Jr., and J. J. Craighead. 1972. Grizzly bear pre-hibernation and denning activities as determined by radiotracking. *Wildl. Mongr.* 32. 25pp.
- Haroldson, M.A., M.A. Ternent, K.A. Gunther, and C.C. Schwartz. 2002. Grizzly bear denning chronology and movements in the Greater Yellowstone Ecosystem. *Ursus* 13:19-37.
- Jonkel, C. 1980. Black, brown (grizzly), and polar bears. Pages 227-248 in *Big Game of North America, Ecology and Management*. Stackpole Books, Harrisburg, PA.
- Judd, S. L., R. R. Knight, and B. M. Blanchard. 1986. Denning of grizzly bears in the Yellowstone National Park area. *Int. Conf. Bear Res. and Manage.* 6:111-117.
- Kolenosky, G. B., and S. M. Strathearn. 1987. Winter denning of black bears in east-central Ontario. *Int. Conf. Bear Res. and Manage.* 7:305-316.
- Lindzey, F. G., and E. C. Meslow. 1976. Winter dormancy in black bears in southwestern Washington. *J. Wildl. Manage.* 40(3):408-415.
- Linnell, J.D.C., J.E. Swenson, R. Anderson, and B. Barnes. 2000. How vulnerable are denning bears to disturbance? *Wildlife Society Bulletin* 28:400-413.
- Mack, J. A. 1990. Black bear dens in the Beartooth face, south-central Montana. *Int. Conf. Bear Res. and Manage.* 8:273-277.
- Miller, S. D. 1990. Denning ecology of brown bears in southcentral Alaska and comparisons with a sympatric black bear population. *Int. Conf. Bear Res. and Manage.* 8:279-287.
- Rogers, L. L. 1977. The ubiquitous American black bear. Pages 28-32 in *North American Big Game*. Boone And Crockett Club. Parker and Nesbitt (eds).
- _____ 1981. A bear in its lair. *Natural History Magazine*. 70(10):64-70.
- Servheen, C., and R. Klaver. 1983. Grizzly bear dens and denning activity in the Mission and Rattlesnake Mountains, Montana. *Int. Conf. Bear Res. and Manage.* 5:201-207.
- Tietje, W. D., and R. L. Ruff. 1980. Denning behavior of black bears in boreal forest of Alberta. *J. Wildl. Manage.* 44(4):858-870.
- Vroom, G. W., S. Herrero, and R. T. Ogilvie. 1980. The ecology of winter den sites of grizzly bears in Banff National Park, Alberta. *Int. Conf. Bear Res. and Manage.* 4:321-330.
- Wickelgren, I. 1988. Bone loss and the three bears: A circulating secret of skeletal stability. *Science News*. 134(26):424-4