

BUILDING THE FUTURE

Building a Polar Bear Den at the Calgary Zoo

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A polar bear's summertime objective, wild or captive, is to stay cool! In the Churchill area of Canada, polar bears come off the ice in mid-June and move inland to dig various forms of day beds and dens into the permafrost (Stirling, 1988). They intersperse

appetite waned and she became choosy about her food, often preferring not to eat at all. This "denning in the building" behavior meant that she was off exhibit during the peak visitor season. In winter, her activity level dramatically increased, as did her appetite. At this time, she made greater use of the enclosure and once again became visible to the public. Chronic pacing and atypical fur and appetite loss were interspersed with these behaviors from the beginning of October to the end of June.

We have been studying Misty's chronic pacing habit and associated symptoms for the last four years to ultimately diagnose and resolve the problem. As with our previous research into stereotypies, part of that process has involved enclosure redesign and enrichment (Poulsen et al., 1996). Our objectives in building a den for Misty were three-fold: 1) to help Misty eradicate her pacing behavior; 2) to give Misty a more natural and secure place to "summer hibernate"; and 3) to make Misty more visible to the public.

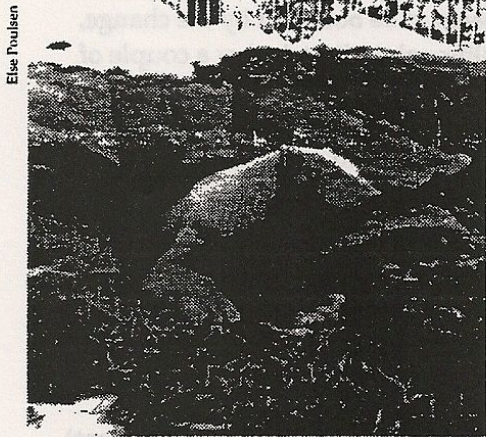
The core of the den was constructed of two large cement culverts, 4 feet in diameter by 4 feet long, donated by the Waterworks Department of the City of Calgary. When positioned end-to-end, these culverts are designed to interlock via a 6-inch lip on one end, adjoined to a 6-inch sleeve on the other culvert. In preparation for laying the culverts,

we had a back hoe dig an 8-foot-long channel approximately 1.5 feet into the ground. This channel was to keep the culverts from rolling once they were in place. We then brought the culverts in by crane and lowered them into the channel, then connected them as they were designed to do.

Using the crane, we stabilized the now 8-foot-long culvert by placing boulders around three sides. A giant boulder fit on one end to close off the back end of the den. Boulders were also placed at the den entrance to simulate a cavelike formation and actually increased the length of the structure by 2 feet, making the final structure 10 feet long. Boulders were then placed on top of the structure to create a small hill (Figure 1).

The top boulders added height to the hill and helped hold the woodchips and dirt that we then poured over the structure. Four crane-bucket loads of woodchips and dirt were used to finish off the appearance of a cave in the permafrost. While we still had the crane on site, we added more tree trunks to the exhibit and more boulders to Misty's 60,000-gallon pool.

Our 9,000-square-foot enclosure was constructed in 1973 of cement, just like the vast majority of early 1970s bear exhibits. We added woodchips and dirt as substrate a few years ago simply by adding this medium on top of the cement. This change alone made a huge difference



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"denning" with a bit of wandering around. They do not actively hunt at this time and rarely eat, because food consumption generates heat energy. By mid-November, most of the bears have left the southerly shores of Hudson's Bay and head north to hunt seals again, as their activity levels and appetites dramatically increase.

The Calgary Zoo's polar bear, Misty, is a 21-year-old female rescue animal from Churchill. In her 20 years at the zoo, Misty has expressed a mix of natural and stereotypic behaviors. For about 10 weeks in the summertime, she would "den up" in the semi-darkness of the building and rest on the cool cement floor. Her



to our bears in terms of the opportunity to express digging, nest building, and grooming behaviors.

The addition of the den has been a huge success. It was built at the end of June 1996 and by the first week of July, Misty had moved in. We gave her a selection of nest building materials: straw, tree branches, hay, woodwool. Her preferences were straw and browse.

Upon close inspection, Misty's den nest is a work of art. She has carefully lined the bottom of the den with a hard layer of straw bits and bouncy branches. The top layer of the nest is made up of fluffed straw. She has been very fastidious, fluffing and turning the top layer every day. Once or twice a week, she replaces the top layer with fresh straw. We have never found any feces in the den, although occasionally we've found stored apples and a bone or two. Only rarely

she spent much less time in the den, being active in the enclosure. We had

the den cool for her.

This change in the length of the

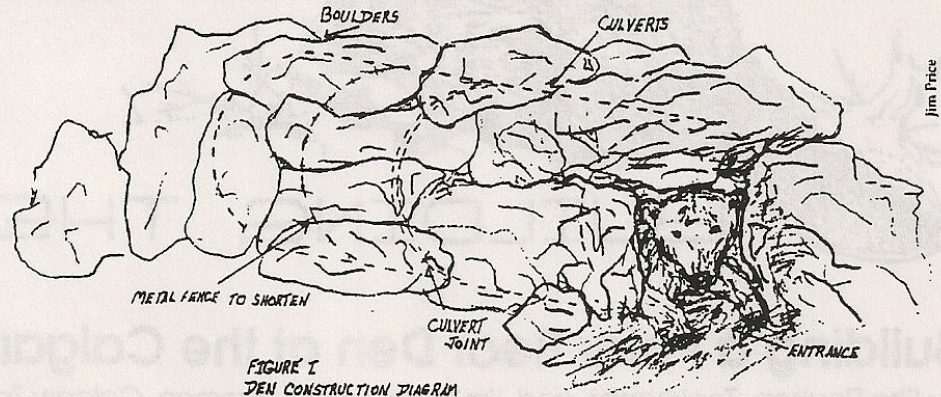


FIGURE 1
DEN CONSTRUCTION DIAGRAM

hoped for and expected this seasonal turn of events. In the winter months, she still maintained her nest every day and slept in the den at night. She also weathered winter storms in the den. Despite temperatures as low as 40 degrees F, she still preferred to den outside rather than move into the heated (32 degrees F) building, but we always gave her the option.

Before we built the den, Misty spent every winter pacing variable amounts of time during the day. This past winter, she did not pace. Instead, she spent 15 weeks ice breaking, pulling whole food items in and out of holes in the pool ice, fluffing and cleaning her den nest, day-bed building in the snow, swimming during the night, and hunting for treats throughout the day. This is a remarkable improvement.

The den structure was built to be about 10 feet long. We found that when Misty went into the back of the den, she disappeared completely from public view. It was decided that we could shorten the den by 2 feet and still serve Misty's needs. Our welder built a metal fence welded onto a metal ring, which he bolted into the cement two feet from the back end. The fence has a small door in it that is about one-foot square. This door allows the keeper to access the two-foot empty space created by the fence. In this space, we stuffed straw to act as insulation for cold winter days. When the summer comes, we remove the straw to keep

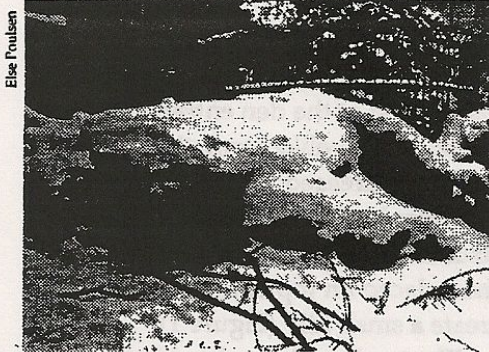
den has been effective. Soemtimes the public can see Misty sleeping near the opening of the den, other times they can see a fuzzy, white lump in the darkness of the den. Zoo visitors seem happy with this. There has been great public support for the opportunity to see her denning, even if she isn't completely visible. Misty did not seem to be bothered by the change, although it did take her a couple of weeks to adjust to the new dimensions.

We would recommend that the length of the final product be no more than 8 feet. This can be done by either 1) using cement culverts that are in total 6 feet long (plus 2 feet of rockwork at the entrance), or 2) by stuffing the last 2 feet of an 8-foot culvert with boulders at the back (plus 2 feet of rockwork at the front).

We feel that the den has made a great difference to the mental and physical well-being of our bear. Research into her pacing habit and associated symptoms is ongoing and will be published at a later date. We have made a video of the den construction, and it is available through The Enrichment and Training Video Library.

References

- Poulsen, E., Honeyman, V., Valentine, P. and Teskey, G.C. 1996. Use of fluoxetine for the treatment of stereotypical pacing behavior in a captive polar bear. *Journal of the American Veterinary Medical Association*. (8):209.
- Stirling, I. 1988. *Polar Bears*. Ann Arbor: University of Michigan Press



do we actually enter the den.

The den offers Misty more than just a chance to nest build—it also offers her security. Because no one can lock her in or out, she is in full control of her own comings and goings. She has been conditioned over many years to come into the building to look for treats, and we continue this practice. When we need to clean the enclosure or do veterinary work, we can lock her in the building at that time.

Misty spent the summer of 1996 denning on exhibit. She came out periodically to nose around, swim, groom, chase fish, and so on. By mid-November, Misty's activity level and appetite dramatically increased, and