



Bear-Resistant Containers for Rafters

Keith Windell, Project Leader

Rafters commonly carry plenty of ice, food, and cold beverages in large, lightweight plastic coolers. Coolers that were bear resistant might be more convenient for rafters and boaters than other approved methods for securing food that is not attended in areas with special Federal food storage regulations. Approved methods for food storage include:

- Hanging food from a tree (at least 10 feet off the ground and 4 feet from the trunk)
- Storing food inside an approved portable electric fence
- Putting food in a permanent food-storage box at a campsite

During this project, the Missoula Technology and Development Center (MTDC) contracted with two private vendors who fabricated prototype metal rafting containers that were intended to be bear resistant. A commercially available plastic cooler also was evaluated.

The Interagency Grizzly Bear Committee (IGBC) has established a testing protocol for bear-resistant food-storage containers. It calls for:

- Containers 18 inches or longer and 10 inches or larger in diameter—must withstand an impact test of a 100-pound weight dropped from 2 feet onto the weakest side of the container.
- Any containers not made from metal—must withstand a penetrometer test where 125 to 135 pounds of static force is applied to a pointed metal rod (radius of 0.06 inch) that is placed on the container's edges where a bear could bite.
- Any container at the discretion of the IGBC—must withstand 90 minutes of testing by captive grizzly bears at the Grizzly and Wolf Discovery Center at West Yellowstone, MT.

The commercially available plastic cooler failed the penetrometer test at MTDC and did not keep the bears out when it was tested at West Yellowstone. A prototype insulated aluminum dry box that passed the impact test and almost passed the captive-bear test did not have enough insulation to satisfy river managers during the field evaluation. The prototype aluminum storage box that was

Highlights...

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- A bear-resistant aluminum storage box could secure a plastic cooler more conveniently than hanging the cooler in a tree (at least 10 feet off the ground and 4 feet from the trunk) or securing the cooler inside a portable electric fence.
 - Prototypes were designed to see whether they could be made bear resistant.
 - All prototypes were heavier than rafters preferred, and bears damaged all of them during testing.
 - Although one prototype showed promise and was ready for field testing, the project was terminated because of budget shortfalls.



uninsulated passed the impact test, but captive bears broke some of the welds on the hinge securing the lid. MTDC feels that a properly welded box probably would survive testing by captive bears. This prototype had not been tested by rafters before the project was terminated.

Beginning the Project

River managers on the Rogue River in Oregon were contacted to discuss the problem of black bears breaking into floaters' coolers and to establish design criteria for bear-resistant rafting containers. The intent of the project was to come up with prototypes and test them in a Forest Service raft used by river managers on the Rogue River. Two systems are in place to certify bear-resistant food-storage containers for backcountry outfitters and backpackers.

A combination of the pass/fail criteria used by the Sierra Interagency Black Bear Group (SIBBG) and the IGBC was used as the standard for testing the prototypes developed for the rafters and boaters. The intent was to get full certification from each of these entities as the benchmark that must be met for any current and future designs. A fully successful design must pass a combination of the various tests and practical field evaluation.

Containers Tested

All of the containers were tested at MTDC before being taken to the Grizzly and Wolf Discovery Center at West Yellowstone, where they were tested by captive grizzly bears.

Commercially Available Plastic Cooler

Cabela's sells the Outfitter Outback 150-quart cooler (figure 1), which is made from tough polyethylene with ultraviolet blockers and is insulated with polyurethane foam. It is 40½ inches long, 20½ inches wide, and 21 inches tall. It weighs 64 pounds empty. It has a continuous stainless steel hinge and two stainless steel, hasp-style latches that can be locked. A steel faucet drains the cooler. Carrying handles are molded into the ends of the cooler. The cooler is watertight (has a rubber seal) and costs \$350.



Figure 1—Cabela's Outfitter Outback 150-quart cooler.

Insulated Dry Box

American Whitewater Products was contracted to fabricate an insulated dry box (figure 2). The 0.080-inch-thick, twin-walled aluminum box has 1½ inches of foam board insulation sealed between the walls. The marine-grade aluminum (5052) has good corrosion resistance and strength. This type of aluminum is commonly used in rafting frames.

The box is 42 inches long, 20 inches wide, and 20 inches tall so that it will fit the raft used by Forest Service river managers on the Rogue River. The box weighs about 62 pounds empty. It has a continuous aluminum hinge that is riveted on, three lockable latches, and a raised edge (lid guard) to keep bears from getting their claws under the lid. The box is watertight (has a rubber seal) and has a drain plug. Metal handles were riveted to both ends. The prototype dry box cost about \$600 to manufacture.



Figure 2—The American Whitewater Products prototype insulated dry box.

Storage Box for Coolers

Bear-Aware Co., which makes pannier-style cooler boxes for backcountry horse outfitters, contracted to make a box (figure 3) that would provide bear-resistant storage for a plastic cooler. The idea was that it would be easier for floaters to carry the storage box and the cooler ashore in separate trips than to carry a heavy cooler that had been reinforced to make it bear resistant.



Figure 3—The Bear-Aware Co. prototype of a bear-resistant storage box designed to hold a plastic cooler.

The storage box is 42 inches long, 20 inches wide, and 20 inches tall. It weighs 35 pounds empty. A 128-quart marine Igloo cooler fits inside. The cooler's carrying straps were lengthened so the cooler can be removed easily from the storage box. The storage box was made from 0.090-inch-thick, marine-grade aluminum (5052) with extra reinforcement in the lid. The lid was recessed and used three spring-loaded, quarter-turn fasteners (figure 4) instead of traditional hasp-style latches. A coin or screwdriver must be used to lock or unlock the fasteners. The lid can be used as a handle. The bottom of the box has holes drilled into it so water will not collect inside. The prototype storage box cost about \$1,066 to manufacture.



Figure 4—One of the three quarter-turn fasteners securing the lid of the Bear-Aware Co. prototype storage box.

Results of Testing

Impact (figure 5) and penetrometer testing (figure 6) were conducted at MTDC. Captive grizzly bears at the Grizzly and Wolf Discovery Center also tested the containers. Before the containers were placed in the bears' exercise area, dog food was sealed inside and peanut butter was smeared on all seams and latches (figure 7).



Figure 5—A backcountry horse pannier undergoing impact testing at MTDC.



Figure 6—A food-storage container undergoing penetrometer testing at MTDC.



Figure 7—Before containers are tested by captive bears, dog food is placed inside and peanut butter is smeared on seams and latches.

Commercially Available Plastic Cooler

The Cabela’s plastic cooler passed the impact test, but failed the penetrometer test (intended to simulate a bear’s claw or tooth penetrating the plastic). Captive bears ripped the lid off the cooler (figure 8) during the 90 minutes of testing.



Figure 8—This bear found lunch inside the Cabela’s Outfitter Outback cooler.

Insulated Dry Box

The prototype insulated aluminum dry box by American Whitewater Products easily survived the impact test. However, captive bears only tested the dry box for about 60 minutes before the day was over. Because the dry box was not tested for the 90 minutes required by the IGBC protocol, it did not officially pass the captive bear test. It sustained a little damage on the recessed lid guard (figures 9a and 9b), which had to be bent slightly before the dry box could be opened.



Figures 9a—This bear appeared to be dancing on top of the American Whitewater Products prototype insulated dry box.



Figures 9b—After 60 minutes, bears slightly damaged the American Whitewater Products prototype insulated dry box.

Storage Box for Coolers

The Bear-Aware Co. prototype storage box survived the impact test. During testing by captive bears, it sustained numerous broken welds (figures 10a and 10b) and did not pass. Bears would eventually have slid their claws into the hinge cracks, pried off the hinge, and removed the lid from the storage box.



Figures 10a—This bear is attracted to the Bear-Aware Co. prototype storage box because of the tasty peanut butter on the outside and the smelly dog food on the inside.



Figures 10b—Although bears broke several welds on the hinge securing the lid of the Bear-Aware Co. prototype storage box, they did not get inside.

Field Testing

After the dog food and peanut butter had been cleaned out of both aluminum prototypes and the broken welds had been repaired on the Bear-Aware Co. prototype storage box, they were sent to the Rogue River for field testing.

Ken Vines, (Rogue River manager) sent an e-mail message describing the results of the field evaluation. His key points about the shortcomings of the American Whitewater prototype insulated dry box were:

- It does not insulate as well as typical plastic coolers; ice melts twice as fast.
- It is heavier and a little harder to open than a typical plastic cooler.
- It has to be removed from the raft to access the drain hole, which is on the end.
- It sits higher in the raft and may cause problems with rowing.

Rogue River managers hadn't taken the Bear-Aware Co. prototype storage box out for testing, but they seemed more interested in that prototype than in the insulated dry box prototype.

Conclusions

Budget shortfalls caused this project to be terminated. At this time, no food-storage containers specifically for rafters or boaters are available that claim to be bear resistant or that have been officially certified for food storage by the Sierra Interagency Black Bear Group or the Interagency Grizzly Bear Committee. Although bear-resistant coolers could be helpful for rafters and others, rafters have other options for securing their food.

About the Author

Keith Windell is a project leader for reforestation, fire, and residues projects. He has a bachelor's degree in mechanical engineering from Montana State University, as well as an extensive field background in fire suppression. He has worked for the California Department of Forestry, U.S. Department of the Interior Bureau of Land Management, and the U.S. Department of Agriculture Forest Service.

Library Card

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Discusses evaluations of prototype bear-resistant, food-storage containers. Rafters commonly carry ice, food, and cold beverages in large, lightweight coolers. Bears would have an easy time getting into these coolers, and they're so bulky and heavy that they are difficult to hang in trees out of the reach of bears. A commercially available plastic cooler, a prototype insulated dry box made from marine-grade aluminum and foam board insulation, and a prototype storage box made from marine-grade aluminum were evaluated. During a field test of the prototype insulated dry box, river managers found that even when it was filled with twice as much ice as a plastic cooler, the ice did not last as long. The prototype storage box for coolers showed more promise, but funding for the project ended before the storage box could be subjected to additional tests. Both bear-resistant prototype metal containers were much heavier than the lightweight plastic coolers rafters are accustomed to carrying.

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