

Winter can be a perilous season for trout

# WINTER

Photo by Corey Krutbosch

*It's tough being a trout in the winter, especially a small trout. If a predator doesn't get you, the moving ice might. It's so cold you don't want to move. Food is scarce. Best to hunker down and wait until spring.*

“Winter is the most severe time for trout in rivers and streams aside from running out of water during periodic natural droughts or dewatering,” said Tom Annear, water management supervisor for the Wyoming Game and Fish Department (WGFD). Research by WGFD and the University of Wyoming has helped reveal how winter affects trout habitat and how trout have adapted to this stressful time of year.

“Through adaptation to natural climatic conditions, they basically close the door, turn out the lights, and stay put until it's safe to come out in the spring. They go into a state of



# The crystal ceiling

By Lisa Densmore

torpor,” Annear said.

Torpor is not hibernation per se. It is a state of decreased physiological activity that usually results from reduced body temperature and metabolic rate. It enables an animal to survive when food is scarce. In the case of trout, which are cold-blooded and thus have a body temperature that changes with their environment, their metabolism and activity levels slow down as water cools. When the water temperature drops below about 38 degrees Fahrenheit, if a fish is forced to move around a lot (to escape predation), to go after food (an instinct) or because of

changing habitat (such as when ice is forming or breaking up), the energy it expends could leave it weakened and vulnerable to mortality from any of several factors. When there’s an ice roof overhead, their surroundings are more stable so they’re less active, thus greatly increasing their chance of survival.

“Water management strategies in the fall and winter that keep flows stable encourage a solid ice cap to form over a river or stream,” Annear said. “The accumulation of snow on top of the ice creates a dark stable environment that encourages trout to stay put and conserve their



Photo by Jack Ballard

limited energy to survive the entire winter.”

Not moving is the key to survival under the crystal ceiling. That includes not moving to feed, but as food floats by, fish are enticed to move whether they're hungry or not. During the winter, the buffet in the water column is mainly tiny instars (a developmental stage between molts) of aquatic insects that have hatched in fall and early winter. Fish filter aquatic insects and other food from the water through their gill rakers, but instars provide little nutrition because they are too small to be collected by most trout. Annear likened the effort to collecting grains of sand in your hand with your fingers spread apart.

**F**ish might not starve to death trying to eat instars, but they lose body mass. Their body condition deteriorates until they can't resist the current any more than they drift downstream, sometimes to acceptable habitat, but sometimes not.

What qualifies as acceptable habitat depends on the size of the fish. Two- to four-inch trout typically spend the winter burrowed between

cobbles in the stream bottom, but bigger trout can't crawl in a hole. They seek out the slowest moving, warmest water, usually at the bottom of a deep pool. A half-degree can make a difference. It's common for large numbers of trout, often multiple species who wouldn't tolerate each other during the summer, to aggregate in one hole during the winter.

“They're not feeding,” said Wayne Hubert, a fisheries scientist and professor emeritus at the University of Wyoming who has worked closely with WGFD studying stream-dwelling fish, “Once under the ice, rainbows, browns and cutthroats behave the same. Their main concern is habitat selection. If a difference exists, it's small and not well understood. The competition for food is lower, so they're more tolerant of other fish.”

Browns and cutthroats might make good pool-mates under the ice, but their territoriality resumes if the ice melts or in tailwaters that never freeze below dams.

“Anglers think there are no small fish in a tailwater because the fish grow so fast, but the little ones have simply drifted downstream,”

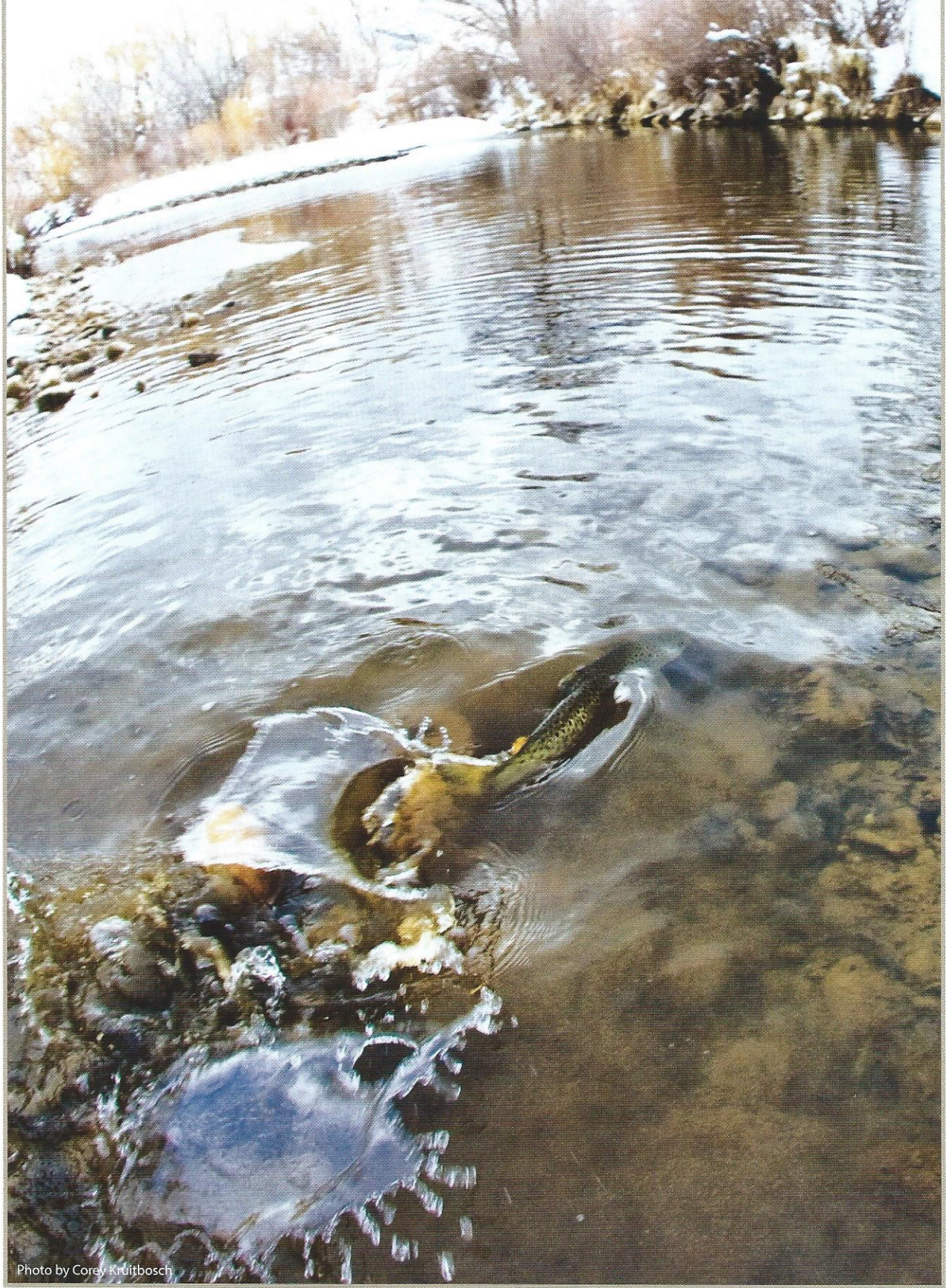
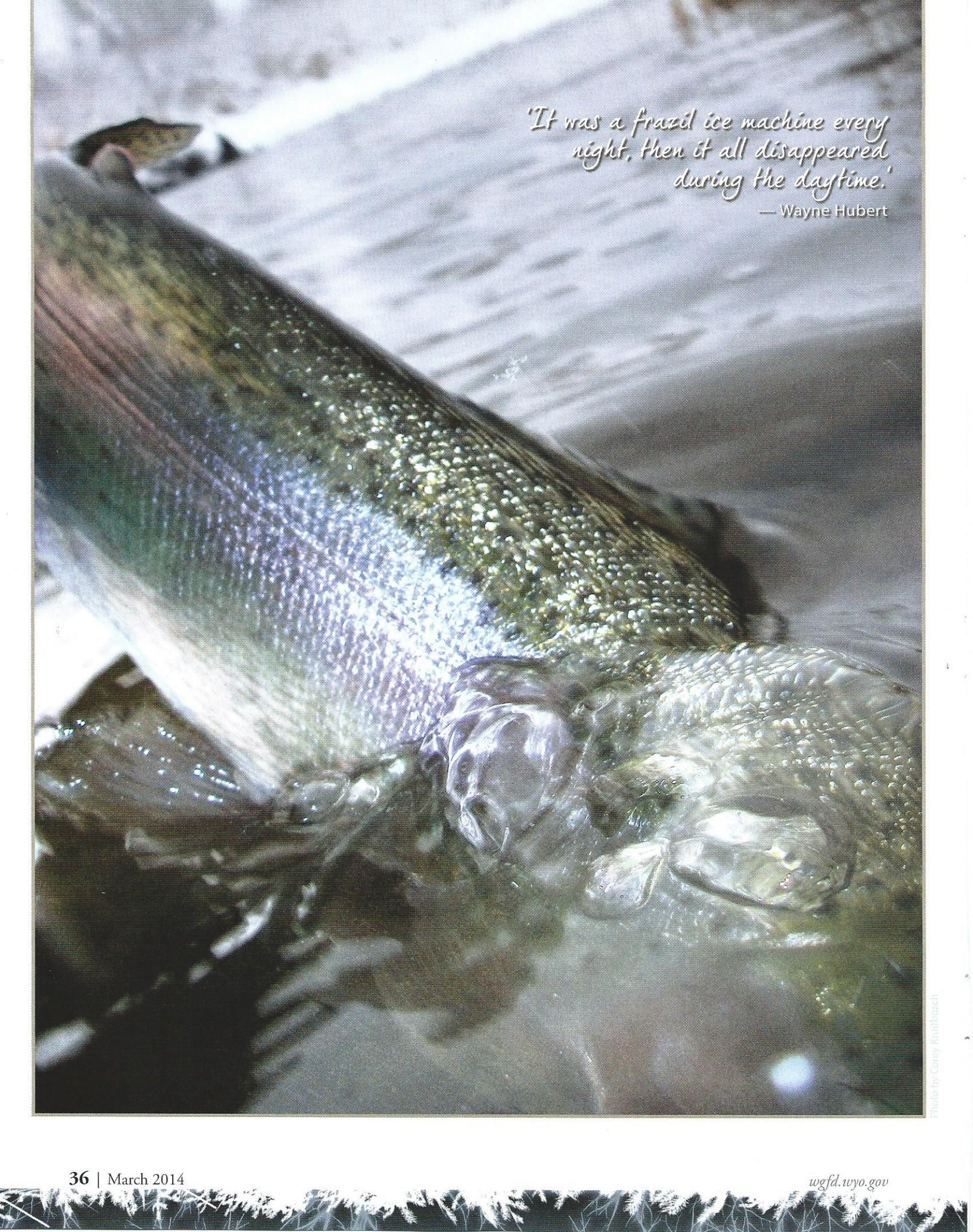


Photo by Corey Kruitbosch

*'A fish is like a cat chasing a mouse, if it sees food, it will go for it.'*

— Tom Annear



*'It was a frazil ice machine every  
night, then it all disappeared  
during the daytime.'*

— Wayne Hubert

Photo by Corey Krauthausch

Annear said. “A tailwater area is not a good place from a bio-energetic standpoint during the winter. The lights are on and the water is moving, so the fish are feeding. Larger trout might not get anything for their effort, but the extra work doesn’t hurt them.”

“Very large trout can do anything they want,” Hubert said. “A 20-inch trout has energy reserves in its flesh. It can go all winter without eating, and it won’t impact its survival. When I catch big brown trout in the early spring, they often look better than in mid-summer if it’s been really warm. A trout needs to reach 12 to 14 inches, the size in which they start to eat other fish, before it has enough energy reserves to remain active during the winter in a tailwater without adverse consequences.”

The most dangerous time of year for trout is during ice-up and ice-out when frazil ice is present in the water. Frazil ice is the slush you see floating on the river surface. It has lots of randomly oriented, needle-like crystals. It typically forms during the coldest part of the night (just before daybreak), then often disappears by mid-morning. Frazil ice is really liquid ice. It’s super-cooled at 31.5 degrees and sticky. If it sticks to the riverbank, it creates shelf ice. Once shelf ice appears, a solid sheet of cap ice forms across the entire surface. Depending on various channel and weather conditions, frazil ice can also create ice dams and completely fill deep pools with ice. When frazil ice is present, fish take cover if they can find it, but that shelter might not be safe.

“If there’s frazil ice, the fish move,” Annear said. “Some leave the system. The browns bump out the cutts from behind boulders. The smaller fish might get under a shelf of ice, but that only provides safety to a point. In one study, we tagged 40 fish to find out what they did during the winter. During every documented period of frazil ice, the trout moved and one-fourth of all the tagged fish were lost. Four left the study area entirely, three were trapped under ice and perished, and the tags of four others were found up on the bank—victims of mink predation. Mammal and avian predators are both factors

under these conditions.”

One mammal, the beaver, can be an important friend to trout during the winter. Trout often seek shelter where riverbanks are undercut, especially where there are piles of brush which provide slow-moving water and a place for a protective ice cap to form. During a study in the 1990s on South Cottonwood Creek in the Wind River Range, researchers found trout had worked their way upstream through a beaver dam to spend the winter under the ice in the pond formed by the dam.

“We learned that beavers play a critical role, especially in foothill and high mountain streams,” Annear said. “Their dams create a haven until spring when high flows help redistribute wintering trout throughout the stream.”

The study on South Cottonwood Creek also shed light on how a stream can provide excellent trout habitat during the summer but be deadly in the winter. In a section of the creek damaged during timbering in the area, WGFD placed in-stream structures to create trout-friendly pools and pocket habitat, but there wasn’t a measurable increase in the number of fish.

“In summer, you would say ‘what beautiful fish habitat,’ but the extreme cold at night during the winter caused frazil ice to form which would hang up on the structures creating ice dams,” said Hubert, who was lead scientist in the project, “It was a frazil ice machine every night, then it all disappeared during the daytime.” Stream levels rose and fell several feet during each ice event causing harmful conditions for trout. Many sought refuge in beaver dams when they could find them. Others likely died.

The South Cottonwood Creek study resulted in insights that have an ongoing effect on fish management decisions today, namely that fish need shelter and stable water conditions to have the best chance of surviving the winter, in their case, the kind found under a crystal ceiling.

—An award-winning writer and photographer, Lisa Densmore ([lisadensmore.com](http://lisadensmore.com)) casts for trout year-round throughout the Northern Rockies. She lives in Red Lodge, Mont.

