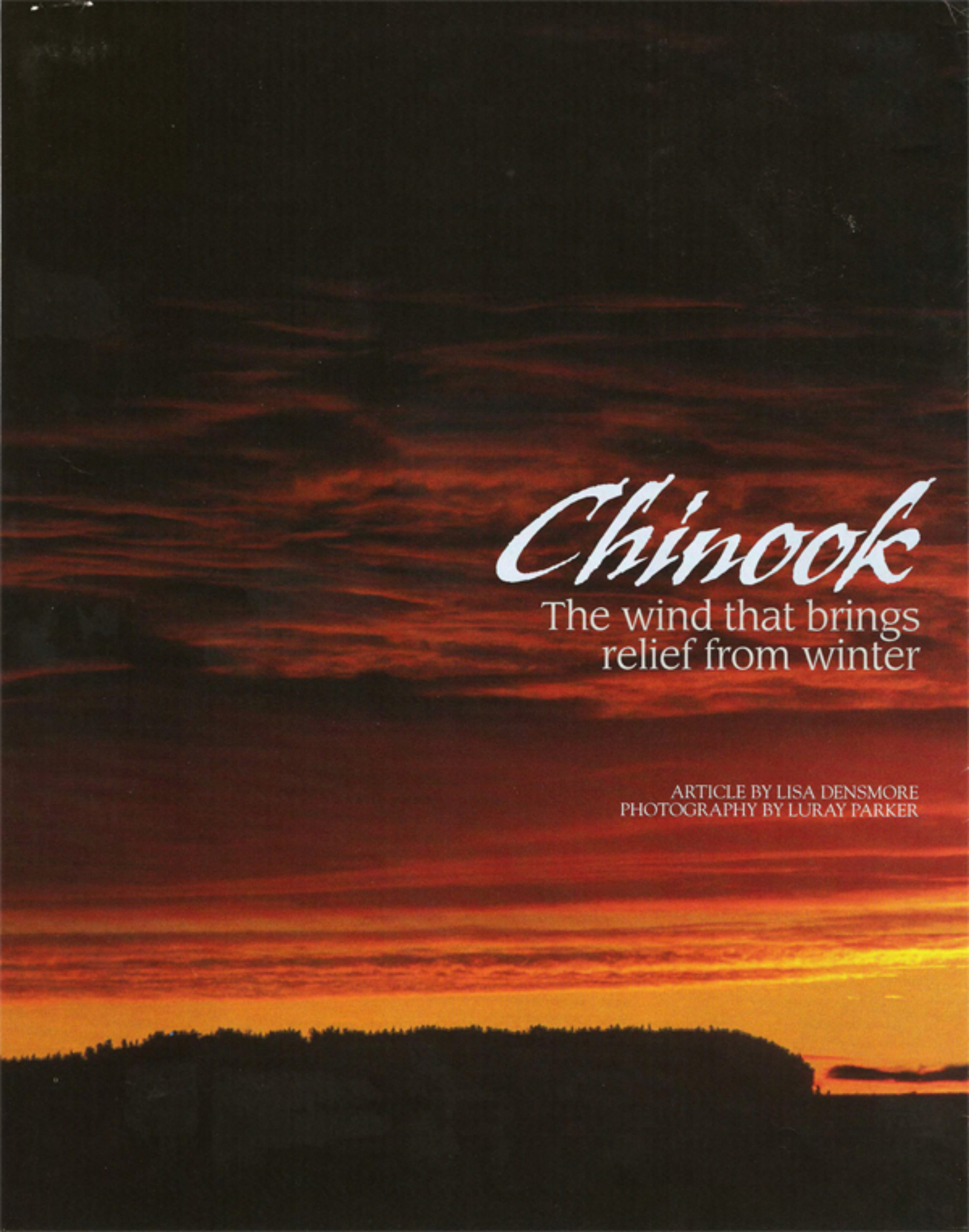

Chinook

The wind that brings relief from winter

ARTICLE BY LISA DENSMORE
PHOTOGRAPHY BY LURAY PARKER

Once upon a time, a Lillooet beauty named Chinook Wind lived with her clan on the Pacific coast near the mouth of the Columbia River. One day, a great warrior named Glacier, passed through her village. He fell in love with Chinook Wind and took her to his tribal homeland near what is now the Birkenhead River in British Columbia. Winter set in. Chinook Wind longed for her warmer seaside home, but Glacier refused to let her return. Chinook Wind sent a message to her people, asking them to rescue her. They came as a multitude of snowflakes, waging war against the mighty Glacier, first pounding him with a blizzard, then raining on him, and finally melting him with a strong hot wind.

Funny how legend often mirrors the real-life chinook wind. Nicknamed "snow-eater," this winter phenomenon feels as if it could thaw a glacier. It commonly dissolves a foot of snow in a day with its trademark increase in temperature, which causes some of the snow to melt and the rest to disappear back into the air in a process scientists call sublimation.

A chinook wind often generates a characteristic cloud formation called a "chinook arch," which often leads to spectacular sunrises and sunsets like this one near Sheridan in late December 1973. (Photo by LuRay Parker)

a chinook sampler

Lethbridge, Alberta
November 11, 1962: wind, 107 mph; temp, 55

Great Falls, Montana
February 24, 2009: wind, 53 mph; temp, 51
January 31, 2009: wind, 56 mph; temp, 46
January 11, 1980: temperature rises from -32 to +15 in seven minutes.

Livingston, Montana
December 15, 2009: wind, 66 mph; temp, 41
January 31, 2009: wind, 85 mph; temp, 46
February 20, 2007: wind, 72 mph; temp, 44

Sheridan, Wyoming
January 2, 2009: wind, 56 mph; temp, 54
January 15, 2008: wind, 64 mph; temp, 51
December 4, 2007: wind, 54 mph; temp, 65

Casper, Wyoming
December 22, 2009: wind, 78 mph; temp, 46
January 5, 2008: wind, 78 mph; temp, 48

Rawlins, Wyoming
February 3, 1999: wind, 93 mph

Cheyenne, Wyoming
January 1, 2009: wind, 67 mph; temp, 45
February 3, 1999: wind, 71 mph; temp, 38
January 20, 1975: wind, 86 mph; temp, 46

Wondervu, Colorado
February 2, 1999: wind, 119 mph

Denver, Colorado
March 22, 2009: wind, 53 mph; temp, 78
December 30, 2008: wind, 47 mph; temp, 58
January 1, 1963: wind, 66 mph; temp, 70

Chinook winds are a phenomenon of the mountains. Along the eastern edge of the Rockies, they are the result of a wind blowing up the west side of the mountains. As the air rises, it cools until the moisture in it condenses and falls as rain or snow. Oddly enough, this process of condensation actually adds a little heat to the air. When the wind descends on the east side of the mountains, it is compressed by the weight of the air above it. This compression also warms the air mass. Cold air pooled at the foot of the mountains can form an inversion that will hold back the chinook flow— when it breaks through the cold air, the chinook may exceed hurricane force and cause the temperature to rise twenty to thirty degrees in a matter of hours or even minutes. A chinook in Colorado and southern Wyoming on February 2 and 3, 1999, generated gusts of up to 119 miles per hour.

In 1972, a chinook wind in Lima, Montana, caused the greatest temperature increase ever recorded in a twenty-four-hour period, when the thermometer went from an arctic minus fifty-six degrees to a balmy plus forty-nine. In 1943, the world's fastest temperature rise occurred in Spearfish, South Dakota, when a chinook whistled through, raising the mercury from minus four to plus forty-five degrees in only two minutes! It climbed another nine degrees over the next hour and a half, then, as the wind died, it dropped back to minus four in only twenty-seven minutes.

Residents along the eastern slope of the Rocky Mountains and other western mountain ranges welcome a chinook's temporary relief from winter's icy grip. However, while a snow-eater brings a dramatic temperature increase, often thirty degrees or more, it is not a friendly breeze. High winds, sometimes of hurricane force and often lasting several days, accompany such a drastic weather change.

Sir Alexander Mackenzie, the Scottish explorer who, in the late 1700s, traversed the North American continent, described the chinook he experienced in the Rainbow Mountains in British Columbia near the end of his epic journey:

". . . it began to hail, rain and snow, nor could we find any shelter but the leeward side of a huge rock. The wind also rose into a tempest, and the weather was as distressing as any I had ever experienced."

The term "chinook

wind" originated in the Pacific Northwest where its namesake Native American tribe was located. Chinook winds, also called "foehn winds" by some meteorologists and "Santa Ana winds" by Californians, occur wherever flat country lies on the downwind side of a barrier mountain range. The farther north you travel, the more common these warm mountain winds are.

Chinooks occur when a warm front drives air up the side of a mountain range during the winter. The warm air moves up the windward side of the range, cooling as it rises. If the air is carrying moisture, this cooling causes it to condense in the form of rain or, more often, snow. It's interesting that the process of condensation itself returns some heat to the air.

Though the air cools as it climbs, it remains much, much warmer than the air mass on the leeward side of the mountain range. At 12,000 feet to 14,000-plus feet, where the warm air crests the highpoint of the range, the warmer wind hits the frigid pool of air on the leeward side of the mountains, and a band of stationary stratus clouds forms, stretching eastward. This striking cloud line, called a "chinook arch," is a foehn wind trademark and provides a multi-hued show throughout the day with a stunning grand finale at sunset.

Sometimes, instead of a chinook arch, a thick immovable fog bank like those in an eerie Stephen King novel, signals the arrival of a foehn wind. Though no scary creatures emerge from the mist, when a warm chinook vies with an arctic air mass, the weather can be surreal indeed, with bitter subzero temperatures in one town and balmy spring-like temperatures in the next. Chinooks can have strange effects on plants, animals, and people, too.

Persistent chinook winds fool dormant plants, such as basswood, apple trees, and raspberries into thinking spring has arrived. Even if they don't appear to awaken, it reduces their winter hardiness, making them more susceptible to subsequent cold snaps. Among trees, particularly lodgepole pine, a "red belt" can develop. As a tree begins to photosynthesize, it requires moisture, which is unavailable because the ground is still frozen. The tree dries out and dies. A stand of timber with "red disease" did not necessarily succumb to a bug, but from sudden, intense dehydration. The danger of forest and grass fires also increases, and if a fire does start, it spreads more quickly and violently due to the high wind and the drying effect of the air.

Chinooks winds are good news and bad news for wildlife. First, the bad news: Already at a lower seasonal flow rate, unfrozen water sources, may dry up completely. In addition, if the temperature drops rapidly after a chinook passes, a layer of crust forms over any snow that remains. Hoofed animals may have trouble digging down to forage, and if they are chased by a predator, fleeing ungulates can lacerate and strain their legs. If the snow depth is reduced, smaller creatures that burrow under the snow for insulation and protection suddenly find themselves more vulnerable to cold and predation.

What's more, the strong wind generates a positive charge, which can electrify wire fences and thus electrocute birds and other animals that touch them. On the bright side, if the snow disappears, it's easier for ungulates and other vegetarians to feed, and the warmer temperature reduces energy loss.

Chinook winds affect humans differently than animals. People may become more irritable, sleep less, and those prone to migraine headaches are more apt to get one. High-strung children fidget even more. And people with asthma and other breathing issues suffer from higher pollution levels due to inversion smog. Denver is notorious for its inversion smog, which remains trapped against the mountains when a chinook blows until the warm air from the west eventually pushes the colder air eastward.

There's a reason Buffalo Bill Cody chose to settle in the location of his namesake town. Taking a cue from the Crow Indians who wintered there before him, he chose Cody, Wyoming, for its unusually mild winters and low average annual snowfall— only thirty-five inches— thanks to frequent chinook winds. But these strong, warm winds, which funnel through the South Fork Valley and through Shoshone and Clark's Fork canyons, can last several days and cause a forested hillside to resemble a giant pile of pick-up sticks.

In Alberta, parents tell their children the story of a cowboy who once rode into town to go to church. When he arrived, he could see only the steeple of the church above the deep snow. He tied his horse to the steeple, then entered the church through a tunnel dug by the churchgoers who had arrived before him. During the service, a chinook wind blew through the town. When the cowboy emerged from the church, he had a heck of a time getting on his horse, which now dangled from the steeple. The moral of the story is that while the warming effect of a chinook wind is a welcome respite from winter's long chill, it's not without its challenges.

Lisa Densmore is the author of the new book, Predicting Weather: Forecasting Planning and Preparing, *part of* Backpacker Magazine*'s backcountry basics series (Globe Pequot Press, Spring 2010). www.Densmore-Designs.com.*