

# Hazy Forecast

BY JENNIFER WEEKS

**LOOMING ABOVE NEIGHBORING** peaks in New Hampshire's White Mountains, Mount Washington is a craggy paradox. Although it lays claim to "the world's worst weather," with year-round snow and winds that can gust at more than 200 miles per hour, this 6,288-foot summit is one of New England's signature outdoor destinations. The hiking web site Peakbagger.com calls the rugged Whites, which offer sweeping views from open ridge tops, "the premier mountain range of the eastern United States."

Each year, more than six million nature lovers visit the surrounding White Mountain National Forest, which covers roughly 800,000 acres in New Hampshire and western Maine and lies within a day's drive of Boston, New York City and Quebec. The forest offers opportunities for outdoor activity in every season, including segments of the Appalachian Trail and the Wildcat River (designated a wild and scenic river) and four commercial ski areas that operate under special-use permits. People come to ski, snowshoe and ice-

climb in winter, and to hike, backpack, fish and kayak in warmer weather.

As the largest block of public land in New England, the forest is highly valued for many uses, but outdoor activities are its biggest draw. According to the current forest management plan, recreation visitors spend more than \$65 million annually in the forest region. Demand is growing for new activities such as mountain biking and all-terrain vehicle use.

The Whites have weathered many assaults, including heavy logging through the mid-nineteenth century, massive forest fires and development. Now, however, they may be facing their biggest challenge yet. Global climate change is altering weather patterns and the timing of seasonal markers,

such as spring snowmelt, and these changes could dramatically affect all outdoor activities in the region. A warmer New England will mean less snow for winter sports; hotter, hazier conditions in summer; and new physical and biological stresses on the forest itself.

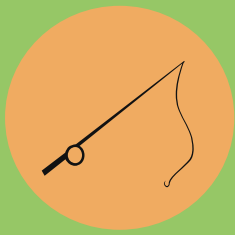
## WARMER AND WETTER

Nowhere is the adage "If you don't like the weather in New England, wait five minutes" more true than in the White Mountains, where it can be sunny in a valley and stormy on a nearby peak, or vice versa. Weather also varies sharply from year to year. Last year the Whites didn't get their

*The White Mountains in New Hampshire attract millions of visitors each year.*



George Wuerthner



first major snowfall until February 14; this winter, northern New England had one of its best snow seasons in decades.

But even factoring in natural variations, evidence of a warming pattern is clear. Average winter temperature measurements at the Mount Washington Observatory rose by 0.71 degrees Celsius (about 1.28 degrees Fahrenheit) between 1935 and 2003. While an increase of this magnitude may not seem significant, it is worth noting that global average temperatures during the “Little Ice Age,” a cold phase that gripped Europe and North America from about 1350 to 1850, were less than 2 degrees Celsius colder than those today.

In the Whites, winter precipitation levels are holding fairly steady, but more is falling as rain and less as snow. Appalachian

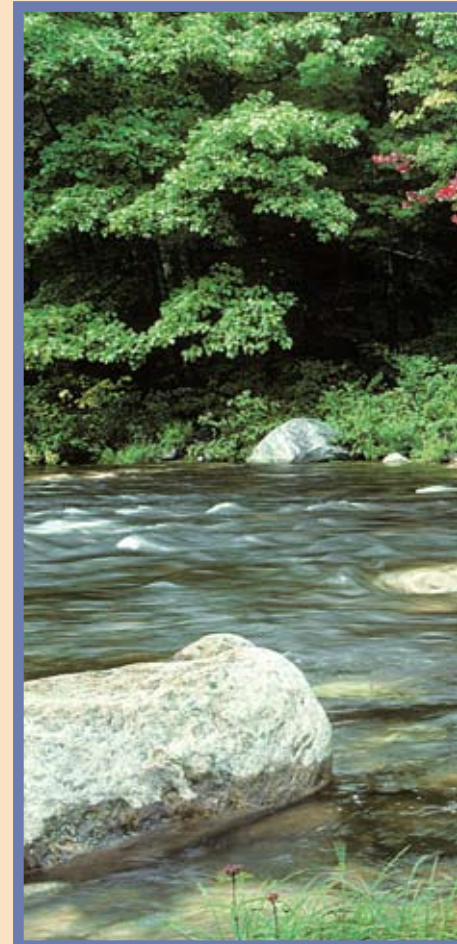
Mountain Club research director Ken Kimball sees this trend as a threat to the winter sports industry. “The problem is less of variability than the greater frequency of poor winters, which makes it hard for outdoor businesses to survive year after year,” he says. “Even if downhill ski areas have snow, people just don’t think about going skiing if there’s not much snow on the ground where they live.”

A few degrees can make a big economic difference. Researchers at the University of New Hampshire and Salem State College calculated in a 2006 study that in cold, snowy winters, the state took in nearly \$92 million in ticket sales and license fees for downhill and cross-country skiing, ice fishing and snowmobiling. In warm, slushy winters like 2006–2007, they estimated,

winter sport revenues fell by about 14 percent, a difference of more than \$13 million.

Warmer winters also affect spring activities. New Hampshire rivers have some 380 miles of Class I to V rapids, many of which are in the White Mountains. Between 40 and 60 percent of annual northeast stream flow occurs within four to six weeks in springtime, the prime window for rafting and kayaking on popular rivers like the Pemigewasset and Saco. Warmer temperatures and a higher ratio of rain to snow will push the peak runoff period back into late winter and make the growing season start earlier. “That will make trees leaf out sooner and start drawing the water table down, which will reduce streamflow,” says Kimball. And reduced snowpacks in warm winters will mean less total

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runoff and lower stream flows.

Lower water levels and warmer water will stress fisheries, especially such cold-water fish as brown, brook and rainbow trout, by making food resources scarcer and preventing fish from migrating to spawning grounds. Warmer water temperatures also reduce concentrations of dissolved oxygen, which fish need for growth and development. Fishing is economically important to New Hampshire,



### IDAHO: BOISE AND SAWTOOTH NATIONAL FORESTS

The growing metropolis of Boise nuzzles up against the Boise National Forest, and an easy hour’s drive will get alpine ski enthusiasts to the Bogus Basin ski area. Cross-country skiers and snowmobilers will find miles of marked forest trails. Summertime campers can choose from seventy campgrounds and 1,300 miles of trails for hiking and horseback riding. Farther north, adventurers can explore the 2.3-million-acre Frank Church–River of No Return and Selway-Bitterroot wildernesses.

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*River flow in the Whites is dependent on snowfall and spring temperatures.*

even healthy adults should avoid exertion outdoors. Ozone pollution is already an issue for Northeast hikers: in 2005, volunteers monitored ozone levels on 143 hikes along the Appalachian Trail from Virginia to Maine and recorded moderate to unhealthy levels on forty-two of those trips.

Ozone harms trees as well as people. It turns evergreen needles brown and causes bleaching and premature leaf drop in deciduous trees. Ozone damage also weakens trees' resistance to insect pests, which could expand their ranges northward as winters become warmer. One invasive pest, the hemlock woolly adelgid, is already causing widespread tree losses throughout southern New England and could spread into New Hampshire, Vermont and Maine in the next several decades. Although pollution and insect damage don't directly affect most mountain sports, they will mean more dead and dying trees in White Mountain vistas.

The Appalachian Mountain Club is recruiting volunteers for its Mountain Watch citizen science initiative, which trains hikers to track indicators such as springtime blooming of

where anglers spent \$172 million on trips and equipment in 2006. In a 2007 poll of self-identified New Hampshire hunters and anglers, commissioned by the National Wildlife Federation, 65 percent of respondents agreed that global warming threatened trout fishing in the state.

Hikers, too, can expect climate change to alter their experiences in the Whites. Alpine zones are a focus of concern. Thanks to cold temperatures, frequent

icing and high winds, the treeline in the Whites is lower than in many western mountain ranges; in the Presidential Range, a ridgeline formed by the highest White Mountain peaks, it averages around 4,500 feet. This gives the White Mountains about 4.5 square miles of alpine zone, the largest block east of the Rocky Mountains. "The alpine peaks are unique and sought-after destinations," says Kimball. "They have 360-degree views, and a lot

of rare alpine plants grow there." As the alpine zones warm, treelines could rise, shrinking the rocky summits that give the White Mountains their name.

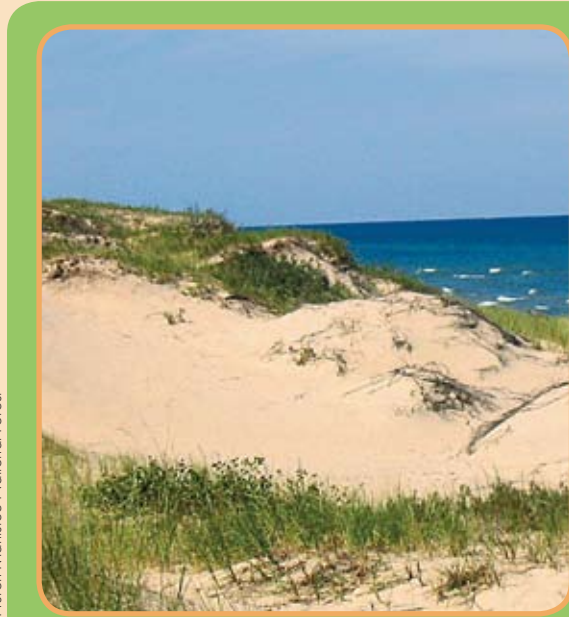
Warming will also alter views and make it harder for hikers to breathe. High summer temperatures increase the formation of ground-level ozone, a gas that irritates eyes and lungs and is the main ingredient in smog. When ozone levels are high, public health agencies often recommend that



alpine flowers, the onset of fall foliage colors at high elevations, and visibility levels at designated view-points. Climate change is expected to reduce visibility by increasing formation of ozone and regional haze. “It’s not all happening at once—these changes take place over years, and New England’s weather is so variable that it can be hard to measure shifts,” says the club’s senior interpretive naturalist, Nancy Ritger. In addition to the Whites, Mountain Watch volunteers are collecting data on Maine’s Mount Katahdin, the Green Mountains in Vermont and the Adirondack Mountains in New York.

## CHANGING BY DEGREES

Climate experts stress that although Northeast temperatures are already rising, impacts could be more or less severe depending on whether the nation acts soon to cut greenhouse gas emissions that cause global warming. The Northeast Climate Impacts Assessment, a study coordinated by the Union of Concerned Scientists, projects that year-round average temperatures will climb 3.5 to 12.5 degrees Fahrenheit in the region by 2100. At the low end of the spectrum, New Hampshire’s summer climate in 2100 would feel



Huron-Manistee National Forest

## MICHIGAN: HURON-MANISTEE NATIONAL FOREST

Situated along the eastern shore of Lake Michigan, the Manistee section of this national forest is thirty miles from Grand Rapids and sixty miles from Lansing. The forest’s Pere Marquette River runs thick with brown trout and steelhead in spring, and with salmon in autumn. Lowland marshes are home to a bevy of bird species. The Nordhouse Dunes Wilderness offers inlanders the chance to hike in undeveloped sand dunes along Lake Michigan.

like Maryland’s today; at the higher extreme, it would be more like North Carolina’s.

Forecasts like these are building support among New Hampshire sports enthusiasts, many of whom identify themselves as politically conservative, for national action to curb climate change. Two dozen Granite State hunting and fishing clubs and outdoor outfitters signed a national letter to Congress in February that called for binding limits on greenhouse gas emissions, plus new funding for fish and wildlife agencies to cope with climate change impacts.

“New Hampshire’s sportsmen—and the local businesses across the state that depend on them—strongly call for policies that

will reverse the threat of climate change and fuel a transition to a clean energy future, while funding the preservation of our fish and wildlife for future generations,” retired wildlife biologist Eric Orff told a task force of state officials in February.

Forests are central to New England’s identity: the region is one of the most heavily forested in the United States, and iconic species like pines and sugar maples are standards on postcards and calendars. As writer Bill McKibben observed in his 1995 book *Hope, Human and Wild*, the Northeast’s spreading woods symbolize a second chance: if they can regrow from nineteenth-century clear-cutting, maybe other ravaged forests can, too.

Unless global warming

short-circuits things. The Whites and other northeastern forests have adapted to local and regional stresses, but climate change works on a broader scale: greenhouse gases mix uniformly in the atmosphere and travel rapidly around the globe, so emissions warming New Hampshire today are just as likely to come from Oregon or China as from nearby sources. To protect their forests and other valuable natural resources, states in the Northeast are regulating some major greenhouse gas producers, such as electric power plants, and targeting others like automobiles. Preserving four distinct outdoor seasons in the White Mountains hinges on this approach—thinking locally, acting globally. **FM**