Wild weather
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It's February in Colorado, but it feels like summer. People are blissful; they're sitting on cafe patios, cutting out early from work for an afternoon bike ride and strolling along downtown's promenade in skirts and sandals.

But for Tim Mathewson, a meteorologist who specializes in fire-associated weather, warm winters give him goose bumps.

The last time Mathewson saw such balmy days in winter was 2012, preceding the state's worst wildfire season. Fire departments in Colorado reported more than 6,000 wildland fires that year. According to a state report, those fires burned thousands of acres, caused millions in property losses and destroyed hundreds of structures.

Like the record high temperatures of this February, warm weather can prime the landscape for fire. Desert air dehydrates trees, shrubs and other vegetation, turning them into kindling for wildfire.

As part of a team, Mathewson tracks weather patterns to forecast wildfire potential, even in the middle of winter. These forecasts help put firefighting resources, like firefighters and air tankers carrying flame retardant, ahead of the fire and in locations where they are likely to be the most useful.

Mathewson knew by early March that 2012 would be an unusual year.

"We went into record high temperatures and dry conditions in early March, and that continued," he says.

"A lot of Colorado's large fires are associated with low humidity, hot temperatures and windy conditions."

Mathewson had seen this once before, in 2002, the year of the Hayman fire, Colorado's largest wildfire on record.

"When you have fire on the ground, especially large fires, it produces its own weather, its own wind. It can produce an environment that's unpredictable," says Mathewson.

The Hayman fire was big enough to generate its own thunderstorm.

Weather and air movement happens because the sun heats the oceans and landmasses with diverse intensity. The differences in what warms up and how

much it warms causes air to circulate. Fire acts in a similar way, just on a smaller scale.

Thunderstorms need three ingredients: upward movement of air (Colorado's mountains take care of that), an atmosphere that supports this upward movement of air (so that lifted air can rise like a hot air balloon does), and moisture.

Ironically, the moisture that contributed to the thunderstorm came from the fire itself. The Hayman fire was large enough that the amount of water evaporating from burning plants reached a critical mass, which then condensed and became an immense thunderhead.

Thunderstorms, which bring rain, seem like a blessing during wildfire.

"There was no other thunderstorm in Colorado that day except for the Hayman fire," Mathewson remembers.

But, rain doesn't always help to put out the fire. Heat from wildfire, especially a large one like the Hayman fire, is so intense that rain can evaporate before hitting the ground.

And rather than just not helping, rain can make the situation worse. When water falls from clouds, it drags air down with it. Even though the water evaporates, the air continues, producing a downward draft and what's known in a firefighter's lexicon as, "outflow winds."

"This can be a dangerous situation [for firefighters]," says Mathewson.

When these drafts hit the fire, they explode outwards in all directions, throwing the fire toward unpredictable destinations.

Fire meteorologists, like Mathewson, can warn firefighters on the frontlines of the fire about incoming weather systems, including those generated by the fire itself.

"We're there for firefighter safety," he says.

Tim Mathewson forecasts wildfire potential from the Rocky Mountain Area Coordination Center in Lakewood, Colo. The center, in cooperation with the Bureau of Land Management and other protection agencies, coordinates deployment of firefighting resources across a five-state region.