A PASSION FOR PREDICTION by Tim Marshall

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A strange ailment strikes hundreds of people each spring. Aspirin won't help and staying in bed just makes it worse. The symptoms--extreme restlessness, watching predawn weather broadcasts, and cleaning camera equipment--strike while the ground is still frozen. The fever causes shivers and loss of control on the first 70°F day, when warm, muggy Gulf air invades the Plains, and stratocumulus clouds race poleward in a stiff southerly wind.

In April, the fever takes control. There are nightmares of storms caught and storms missed. The heart skips a beat at the first severe weather. By now the ailment is highly contagious and is often transmitted via telephone.

Then comes May, oh unpredictable May, when towering thunderstorms sprout and creep across the Plains just begging to be followed. At this point, instinct takes over.

There is only one cure for this malady: storm chasing. By the end of May, hundreds of storm chasers roam the Plains in search of the elusive tornado. They come from as far away as Australia and Japan to crisscross the roads of Tornado Alley. They are all racing to beat the onset of summer, when the volatility of spring gives way to clear, sunny days.

The cure, it seems, is as mysterious as the ailment. All chasers--whether they are scientists, volunteer spotters, law enforcement officers, professional photographers, or students of severe weather--spend long, sometimes lonely days on the road with only a small chance of photographing a remarkable storm. The pull of spring breezes must breed an intense interest in severe weather.
In fact, storm chasers are not alone in their fascination with severe weather. Everyone has an innate respect, fear, or curiosity about it. Many people have had their lives changed forever by it.

The most dedicated storm chasers, however, have a passion born of a need--and love--for the hunt. Chasing itself is a compelling test of strategy. The tornado is merely the bonus.

A chase is really like a nut-and-shell game. There's no guarantee of success--about one tornado in every 10 chases for even the most successful chasers. A good forecast puts you in the thick of severe weather only half the time; and even in the presence of a tornadic storm, a chaser still has less than a 50 percent chance of being in the right place at the right time for the perfect photo or video shot. Yet Roy Britt of Richmond, Virginia, has spent his annual vacations for the last decade pursuing storms. And photographers like Jack Corso and Warren Faidley will stay up all night to capture an impressive lightning shot.

Persistent chasers obviously must have unending patience. All find relief from chase fever in the peaceful open country while watching storms develop hundreds of miles away. It's just you, the road, and the sky.

Chasers enjoy the hunt more if they can take time to appreciate the scenery along the way. They must find beauty in all aspects of the sky. From the crisp white towers of a thunderstorm to the red-orange sunsets, there's no imagining all the colors of the sky until you spend time out on the Plains. But no matter how beautiful the sky or peaceful the scenery, there is nothing more frustrating than to drive hundreds of miles only to sit.around in some remote place on the Plains under a cloud-free sky and get a sunburn. Interpreting the weather incorrectly wastes both time and money.

For the more methodical storm chasers, half the chase is in the forecast. With a good forecast and a little luck, chasers reach their target around midday before storms begin to develop. Witnessing the birth of a storm is the ultimate goal; some chasers feel as if they are kin to it. Ironically, meeting this ultimate forecasting challenge wouldn't be possible without the knowledge of severe storms discovered through storm chasing itself.

Early Days

Storm chasing began after World War II in the late 1940s when an abundance of idle airplanes and pilots gave a group of meteorologists an opportunity to investigate storms firsthand. Operating in Florida and Ohio, the Thunderstorm Project sent aircraft through severe storms to take measurements. Much of what was learned then remains the foundation for our current understanding of storm structure.

The post-war era also saw the construction of dense farm-to-market road networks. The improved road system helped spawn the ground phase of storm chasing. Now chasers could keep up with storms as they moved from state to state. During the 1950s, pioneer storm chasers like David Hoadley and Neil Ward began driving from South Dakota to Oklahoma in search of tornadoes. One of the earliest chasers, Roger Jensen, was photographing storms around his farm in Detroit Lakes, MN. Refer to Figure 1.

At the same time, the Air Force and Weather Bureau began a cooperative effort to study tornado forecasting. The call to action was a tornado that struck Tinker Air Force Base in Oklahoma City, destroying several million dollars worth of aircraft. By the 1960s, successful tornado-forecasting techniques were being used in storm-chase efforts.

In 1972, the Tornado Intercept Project was started in Norman, Oklahoma. This project was sponsored by the National Severe Storms Laboratory and the University of Oklahoma and involved the first organized ground-based storm chasing. Their efforts were rewarded on May 24, 1973, when scientists and chasers successfully intercepted a tornado at Union City, Oklahoma. The hobby of storm chasing was born. Refer to Figure 2.

In the last two decades, there have been hundreds of successful tornado intercepts. In that time, chaser photographs and videotapes have led to a better understanding of storm structure. Chasers were the first to document features like wall clouds, rear-flank downdrafts, multiple vortices, and anticyclonic tornadoes. These films have become a valuable resource in teaching the public and in training storm spotters.

Chaser Convergence

As new knowledge of storms becomes available, chasers refine their hobby. Early spring offers many large tornado outbreaks, but chasers have found that these storms often move too fast--sometimes more than 45 m.p.h. By May, storm systems slow to a crawl, and staying with a storm becomes easier as you zigzag along the road grids.

A storm chase begins the night before. Some chasers will drive all night to get within range of storms the following day.

National Weather Service forecasts--especially convective outlooks--are essential to planning these trips, but chasers also like to examine the weather maps themselves and try to anticipate the next day's convection. Refer to Figure 3.

Chasers usually make their own forecasts not only for the challenge, but also because each has a different empirical method for picking a target. Usually, chase forecasts combine surface- and upper-air data with plain, old intuition. Some chasers consider thermal and moisture boundaries more heavily; others chase just the dryline or go by surface lows. With all the various forecast techniques, it is amazing that many chasers still wind up at the same place--a phenomenon known as chaser convergence. Refer to Figures 4 and 5.

But a closer inspection of the rules of storm chasing demystifies the convergence. Nearly all chasers learn to respect the dryline, a boundary strung from western Texas to the Nebraska panhandle where hot desert air and moist air from the Gulf of Mexico meet. Chasers meet here, too, awaiting the big storm. With other storms developing nearby along the dryline, chasers must keep focused on the original target unless the weather pattern has changed significantly. Otherwise, they'll find themselves racing from storm to storm and will miss the best action.

From a distance, a seasoned chaser can distinguish between a severe storm and a garden-variety storm. A large overshooting dome above the anvil level usually indicates a strong updraft. Midlevel cloud bands reveal the storm's rotation. Increasing southeasterly winds blowing into the storm signal strengthening. But a mushy, ill-defined anvil--one that the sun shines through--usually indicates a weak storm.

With a northeast-moving storm in sight, the best angle of approach is usually from the southeast. This angle affords the best photographic contrast, and, unless the storm shifts, the safest approach to (including less precipitation and lightning) the storm. From this quadrant, the chaser can use a wide-angle lens to capture the entire structure of the storm with light clouds or blue sky in the background and proper back-lighting to reveal features. Refer to Figure 6.

Chasers especially look for an organized cloud lowering at the southwest edge of a thunderstorm--a wall cloud. A persistent, rotating wall cloud can lead to tornadoes, at which time some chasers will switch or zoom to a telephoto lens that captures the point of contact on the ground.

At this point, the biggest danger in a well executed chase is not the tornado but hail and lightning. Some chasers minimize these risks by taking photos from inside their cars, clamping their cameras to the window.

The Ultimate Storm

A few times each decade, a storm reaches an intensity unlike any other storm on the planet. It's called a mega-supercell, and it's the most prolific tornado producer. Such a storm manufactures tornadoes in a continuous pattern over several hours.

Meeting such a storm face to face is an unforgettable event. As far as 40 miles away, the car is buffeted by incredibly strong upflow winds that feed into the storm as if it's a giant hole in the sky. Topsoil whips up into the sky, obscuring visibility for miles. Glimpses of the storm reveal tilted cloud towers from the strong vertical winds that blend the clouds into a giant barbershop-pole configuration. A thick, dense anvil on top blocks sunlight, creating a midnight sky in the middle of the day. This is when the chaser knows the forecasting strategy has verified. The fear rises up within, but control must prevail: A warning needs issuing. A photograph needs taking. Refer to Photograph 7.

Figure 1. The author (left) with chasers Roger Jensen and David Hoadley.

Figure 2. The National Severe Storms Lab in Norman, Oklahoma started chasing storms in the early 1970's.

Figure 3. Chase partner Carson Eads reads from the computer while the author plots the data.

Figure 4. Chaser convergence occurs at the sight of a developing storm on the dryline.

Figure 5. Chasers set up their cameras and wait for the storm to do something interesting.

Figure 6. Being at the right angle at the right distance is a challenge even for the most experienced chaser. Here, Carson Eads checks his camera eyeing a striated supercell that is spinning like a top over a Kansas prairie.

Figure 7. A picturesque tornadic storm is the ultimate prize for this chaser. View looks west near Watonga, OK on October 4, 1998.