

CHAPTER FOUR:

ALL ABOUT WIND and TERRAIN

Most people don't spend a great deal of time thinking about the wind. Sailors, pilots, and other "professionals" may be exceptions, but for ordinary folks, average winds have little effect on their daily lives and go almost unnoticed.

Kite fliers are different.

A kite and the wind together form a system. The wind is the engine. No engine, no flying. For a fighter kite flier, learning about wind and how to "read" it will make the difference between success and frustration on the flying field.

Experienced fliers have a habit of watching the wind constantly, even when not flying. They watch flags, trees, smoke, ripples on water, and all the other signs of movement in the air. Being aware of the wind is second nature to a proficient flier. And when the wind is "right", they begin to get a wistful look in their eyes.

One admonishment before we start — **IT'S NEVER THE WIND'S FAULT!!**

Many fliers wish they could change the wind. If it doesn't blow hard enough - or smooth enough - or soon enough, they get upset.

Trust us — the wind doesn't care what you think! It does what it wants!

Think of all the energy those fliers wasted being aggravated. Resolve to use that same energy learning to cope with the wind the way it is, and you'll be a much better flier. You'll soon be able to fly and enjoy yourself in just about any conditions. You'll be flying while those others are complaining that the wind doesn't listen!

So ... start watching the wind. Get comfortable with it. Become one of those wistful observers who always notices the breeze.

Wind is caused by uneven atmospheric temperatures.

Warmer air expands; cooler air contracts. Different temperatures thus create differences in air pressure. Since nature tends to seek equilibrium, these imbalances even themselves out by moving air from one place to another. Winds result.

Wind Characteristics

The wind has two characteristics that affect fighter kites — smoothness and strength. We'll talk about **SMOOTHNESS** first.

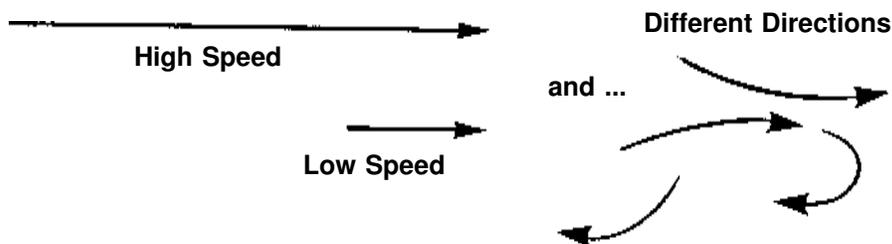
Finding a smooth, regular wind is, of course, preferable. Smooth winds are easier and more pleasant to fly in. Control is more predictable. Accidents are less likely.

Unfortunately, there is no such thing as a truly “steady breeze”. While it's tempting to think of the wind as a smooth, regular progression of air from one point to another, the facts are that it just doesn't happen that way.

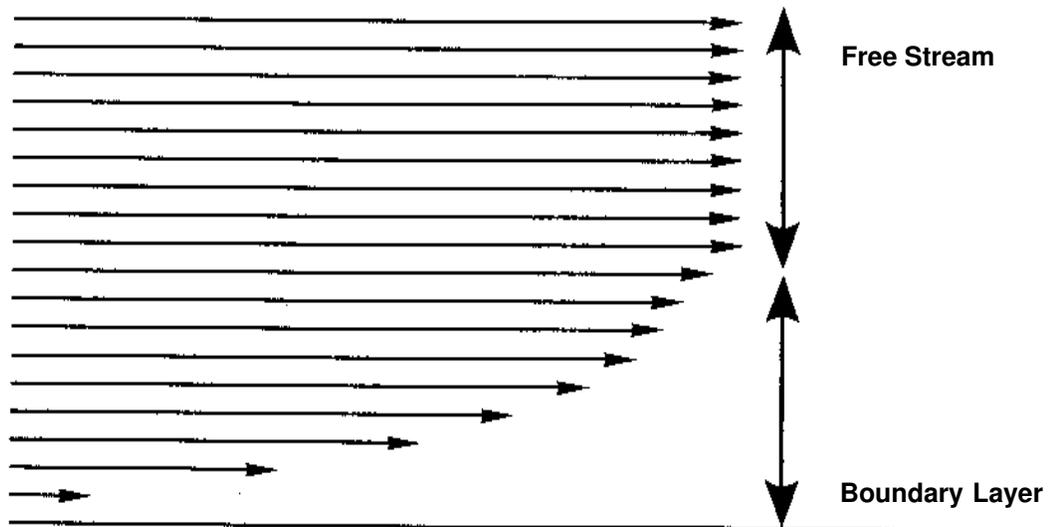
Friction with the ground slows wind down; obstacles like trees, buildings, and hills create turbulence; changes in temperature and even the heat of the ground surface affect wind patterns. And, in the face of all that, your job as a flier is to find the smoothest, most regular wind available.

Sound hard? It's not.

Let's look at the wind. We'll represent the wind with arrows. The direction of the arrow indicates the direction of the wind at that point, and the length of the arrow represents wind velocity:



If the earth were perfectly flat, the wind would look like this. Friction with the ground causes the air near the surface to move more slowly — even when the wind is quite strong.



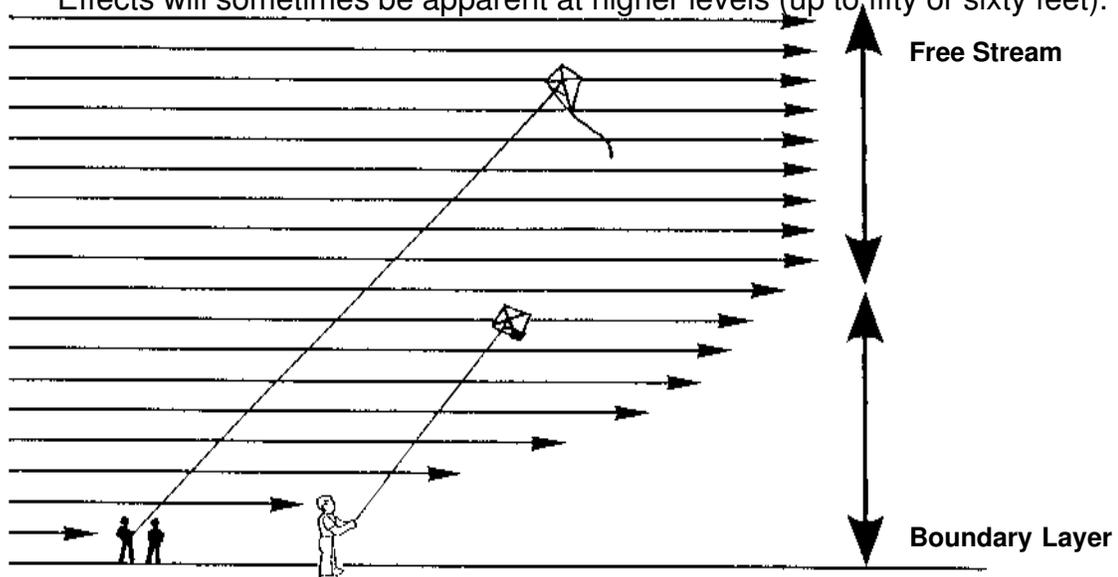
You can demonstrate this yourself on a windy day simply by lying down on the ground and feeling what it's like down there. Higher up, the wind moves faster, but is still affected by the slower air closer to the ground. This creates a region called the **BOUNDARY LAYER** — the region from the ground level up to the level at which the wind is no longer affected. Everything above the Boundary Layer is called the **FREE STREAM**.

The important things to know about the Boundary Layer are:

Its thickness varies.

Its effect on your kite will always be evident at low altitudes (under ten feet).

Effects will sometimes be apparent at higher levels (up to fifty or sixty feet).



So in some respects, those kids with their \$1.25 kite have it better than you do! Their kite will get up into the free stream and stay there, while you maneuver in and out of the slower Boundary Layer. Fortunately, your kite is designed for these conditions and will do just fine. Later on, we'll even talk about how to use the

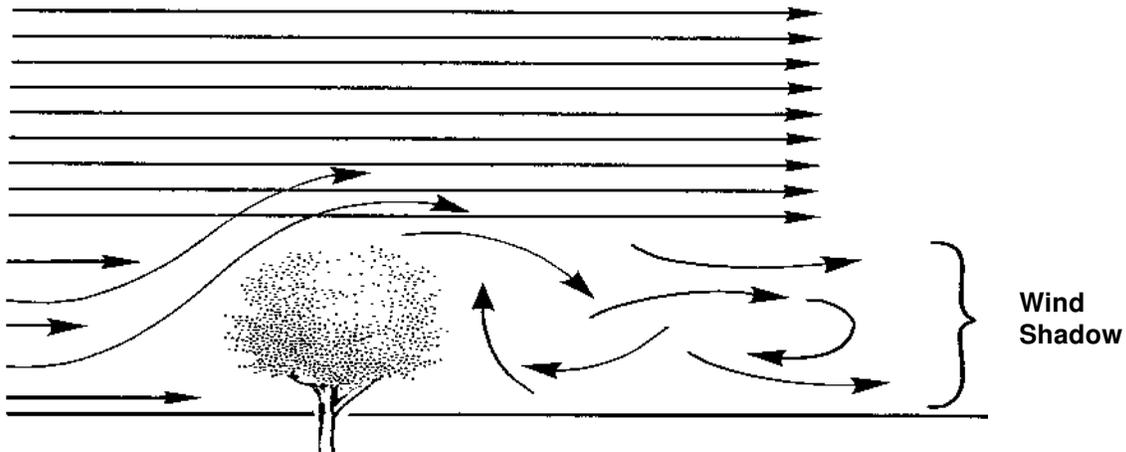
The slower ground wind and faster high air have dramatic effects on your launching, control, and flying speed.

Ground wind and turbulence can make a self launch difficult and frustrating. But you can also use that slower wind to brake a fighter in a long dive and to perform delicate ground maneuvers. If you know what to expect you can also improve your control at higher altitudes

The point is to learn how the wind works and to use that knowledge to your advantage.

boundary layer to produce some spectacular results. The Boundary Layer is something we can't change and which we can actually learn

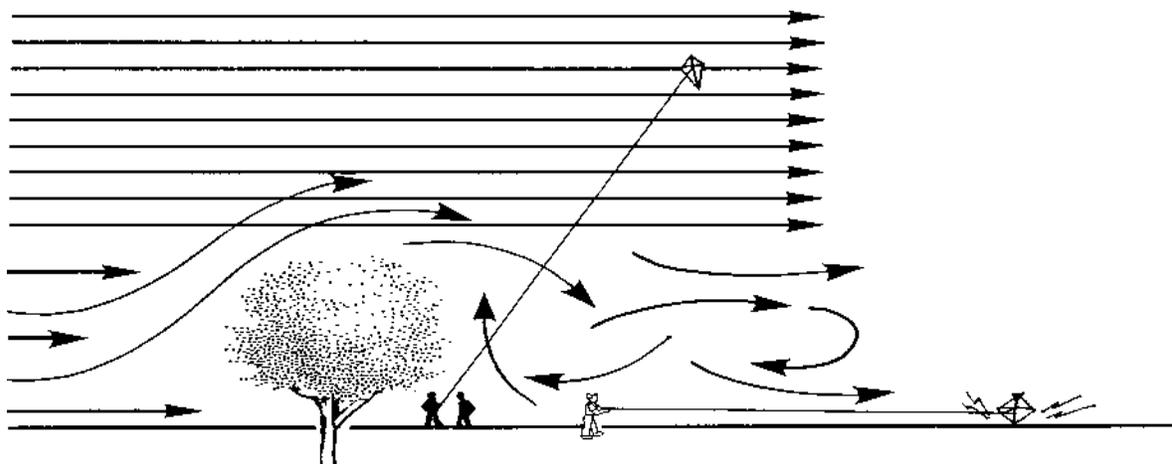
to work with. Turbulence is a different story. Turbulence is definitely bad news. **Turbulence** is generated by anything that gets in the wind's way. Even your kite generates some turbulence which may effect other kites flying nearby.



The turbulent area downwind of an obstacle is called its wind shadow. All wind shadows gradually disappear as you get further away from the obstacle. But not right away. The shadow from a typical tree extends several hundred yards, while a large building can make a shadow a mile long!

The air, flowing over trees, houses and fields, acts much like a river, flowing over rocks, around bends, and through level stretches. Turbulence, in both cases, takes some time to smooth out.

The difficulty with flying in turbulent conditions is that you will experience sudden, irregular, and unpredictable wind shifts. Depending upon the severity of the turbulence, coping with these shifts will range from exhilarating to impossible. So



the message is, in short — If you like crashing, go fly behind a tree.

Strength is the other important characteristic of wind.

Since wind is never perfectly smooth, any discussion of wind strength has to refer to its average strength. So when we talk about a “10 mile-per-hour wind”, understand that the actual wind strength at any instant will vary, but that the “average” will be about ten miles per hour.

Probably the best way to give you a brief overview of wind strength and how it will affect your kite is with the following table. The “Beaufort Scale” was devised by Admiral Sir Frances Beaufort of the British Navy in 1806 as a standard guide for describing the force of wind on sailing ships. (Note the “Beaufort Number” in the left hand column.)

The scale has been modified for land and for kite fliers in particular. We’ve even added a column of information to the scale which describes the effects of the wind

on fighter kite flying.

The Beaufort Scale

<i>Beaufort Number and Designation</i>	<i>Average M.P.H.</i>	<i>What to Look For</i>	<i>Effects on Fighter Kites</i>
0 Calm	less than 1	No wind; smoke rises vertically.	Stay home and read a good kite book.
1 Light Air	1-3	Wind direction just shown by smoke.	Challenging but possible. With a good kite and light line, you'll surprise the other fliers.
2 Light Breeze	4-7	Leaves rustle, wind felt on face, flags flap lazily.	Most fighters will perform fine, although you will need to work to stay airborne.
3 Gentle Breeze	8-12	Leaves and small twigs in constant motion; flags extended.	Perfect conditions! Everything flies well with little physical strain.
4 Moderate Breeze	13-18	Raises dust and loose paper; small branches move.	Control becomes difficult since you are unable to adjust line tension.
5 Fresh Breeze	19-24	Branches and small trees sway; wavelets form on inland waters.	Bordering on too much. The kind of day you can talk about next time there is no wind.
6 Strong Breeze	25-31	Large branches move; whistling in phone and electric wires.	Too forceful for most fighters. Stay home and read another good kite book.

Inexpensive, hand-held wind meters are also available at most kite stores and

Large size in fighter kites is not a virtue. Larger fighters can become a strain on the fingers in strong winds (10 m.p.h. or higher). Even a one-foot fighter can relieve you of a lot of finger skin on a windy day. In addition, smaller fighters can usually be made a bit stiffer, a bit quicker to turn and generally more active, if that's what you like.

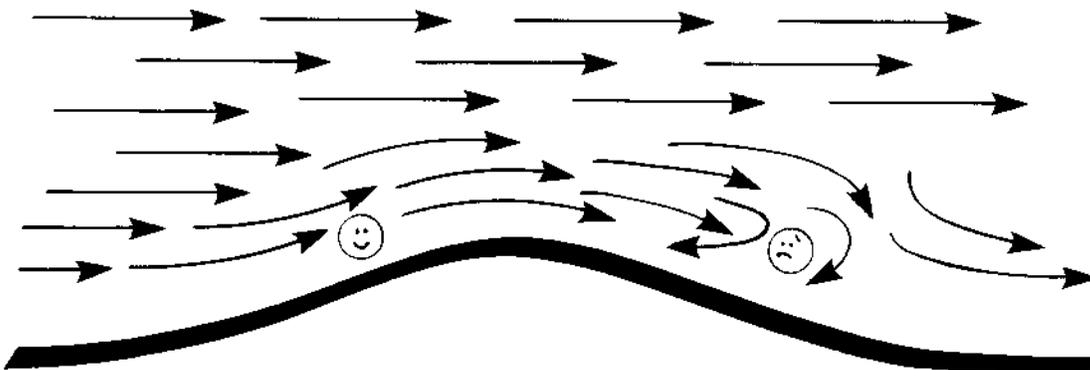
Mel Govig
Randallstown, Maryland

supply outlets. But remember, they only tell you the wind speed at ground level.

PICKING A FLYING SITE

There are two main things to consider when picking a place to fly: the terrain and site safety.

TERRAIN — We know from the previous section that it's difficult to fly well in turbulent wind. Turbulence is caused not only by obstacles, but also by the shape of the ground itself. Let's look at the way the wind flows over a hill.



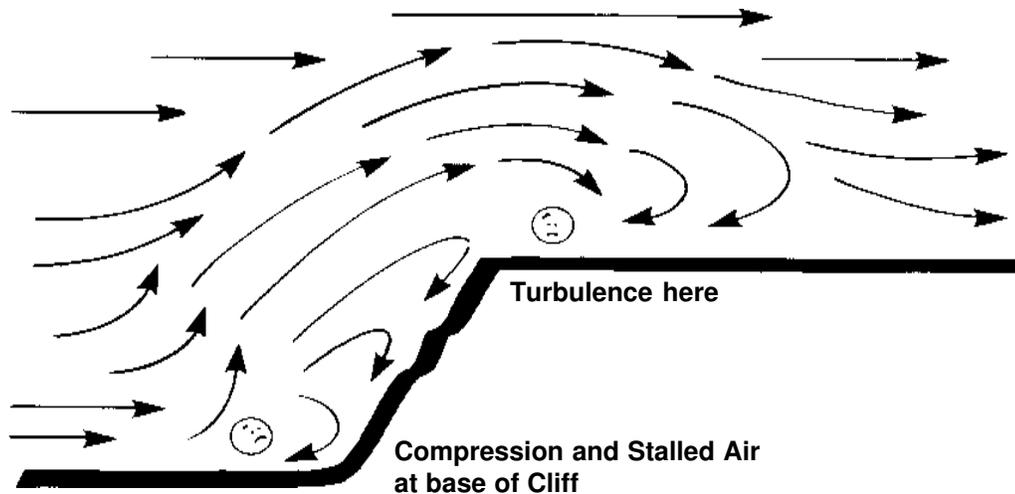
The front face of a hill is great for flying ... but watch out for the back side!!

On the windward, or “front” side of a hill, the air flow compresses and speeds up. These are good sites for flying. A hill that’s the right shape can even help smooth out some of the turbulence reaching it from farther upwind, cleaning up the flow and making for better flying.

The leeward, or “back” side, however, is different. Wind flowing over the crest of the hill separates and causes turbulence that can range from moderate to severe depending on the speed of the wind and the shape of the hill.

So if a little slope is good, a steep slope must be better, right? Well, not exactly.

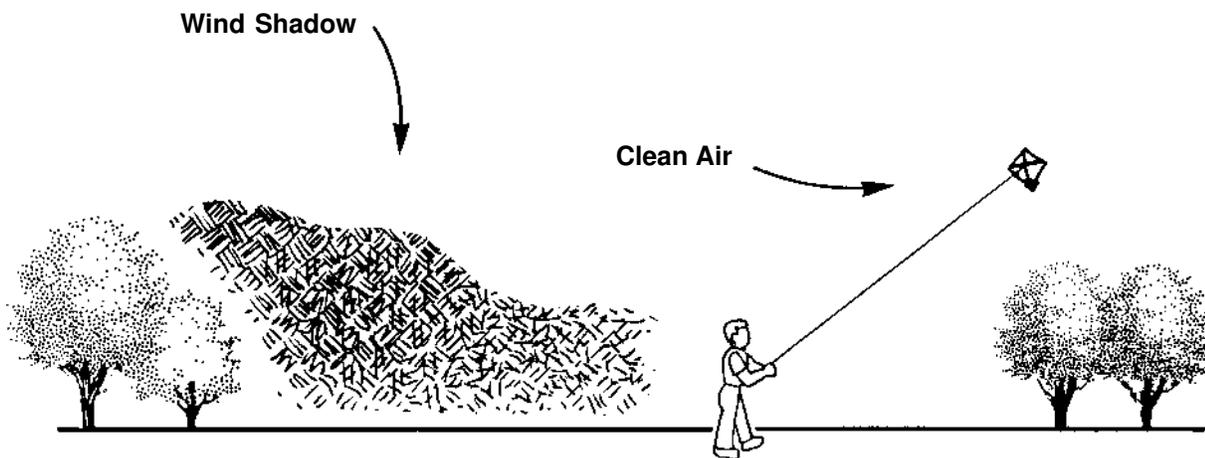
The sharp break at the foot of a steep rise causes the wind to form a pocket of stalled and turbulent air. The break at the top causes turbulence to form just like the back side of a hill.



So the general rule is: Stay away from cliffs.

The perfect flying site is absolutely flat and has no obstructions for miles in any direction. Those are the kinds of places we travel to for big kite festivals. Unfortunately, most of us have to settle for something a bit closer to home for “regular” flying.

Here’s how to make the best of one common situation:



On a field bounded both upwind and downwind by obstructions, you’re better off flying as close as you safely can to the downwind end of the field. Get as far away as

The basic formula for turbulence is that unsteady winds will extend seven times further than the height of whatever object is causing the disruption. If a tree is 100 feet tall, you need to get 700 feet away to find clean or steady wind.

The best advice is to not fly downwind of trees, buildings, or geological formations. In fact, whenever possible, avoid flying downwind of any tall obstructions.

possible from the source of turbulence so the wind will be as “clean” as possible.

SAFETY and COURTESY

You’ll be hearing a lot about safety from us, from your flying friends, from your local shop owner, and from kiteflying organizations. There’s a good reason, so pay attention! A maneuverable kite is a PROJECTILE — capable of doing injury and property damage. You can injure others. You can do damage to your surroundings. You can hurt yourself.

Just to make sure we are absolutely clear, here are three essential safety rules:

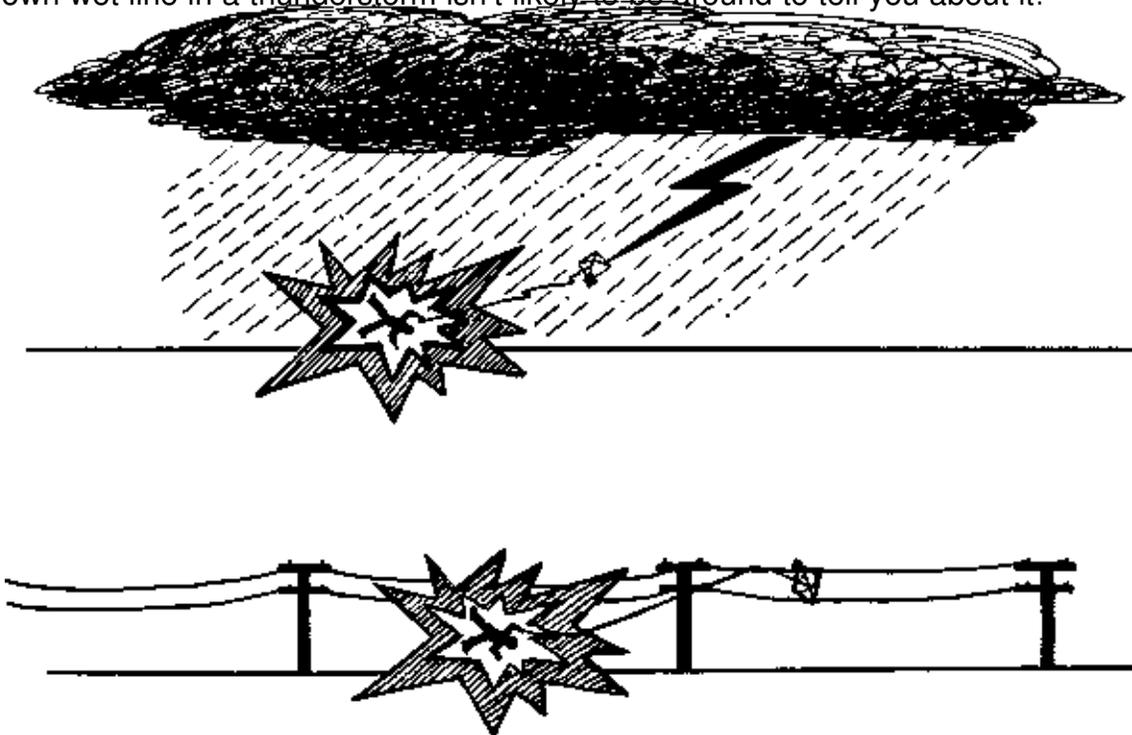
Never fly glass or cutting line around people or unsuspecting kites.

Never dive a fighter over people’s heads.

Never fly in electrical storms or around power lines.

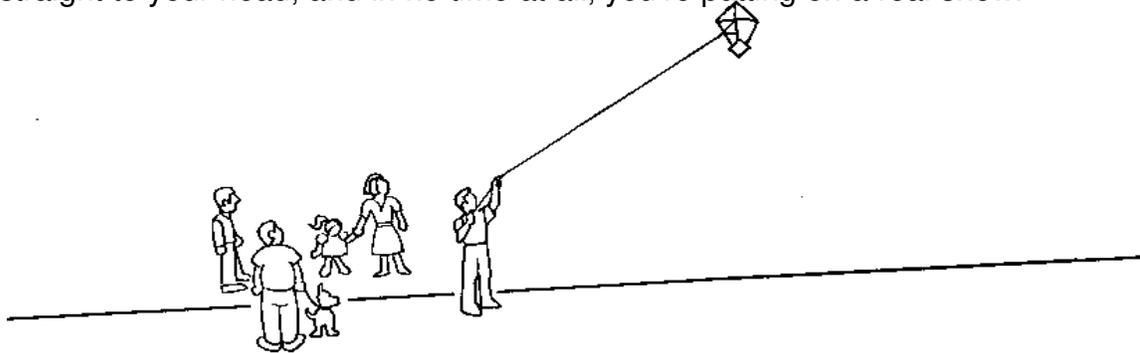
The dangers of glass coated line should be obvious. Whether it’s in the air or lying slack on the ground, **cutting line, by definition, is extremely hazardous**. Flying around other kites that aren’t equipt with cutting line or who aren’t prepared for a cutting contest is just asking for trouble. The easy and best answer is to not do it. There are plenty of good times to use glass line. Besides, it wears out quickly. Don’t waste your line by using it at the wrong time.

Here’s another obvious safety tip: **Stay away from electricity**. Anyone who tells you that wet flylines aren’t conductive hasn’t flown in a thunderstorm. Anyone who has flown wet line in a thunderstorm isn’t likely to be around to tell you about it!

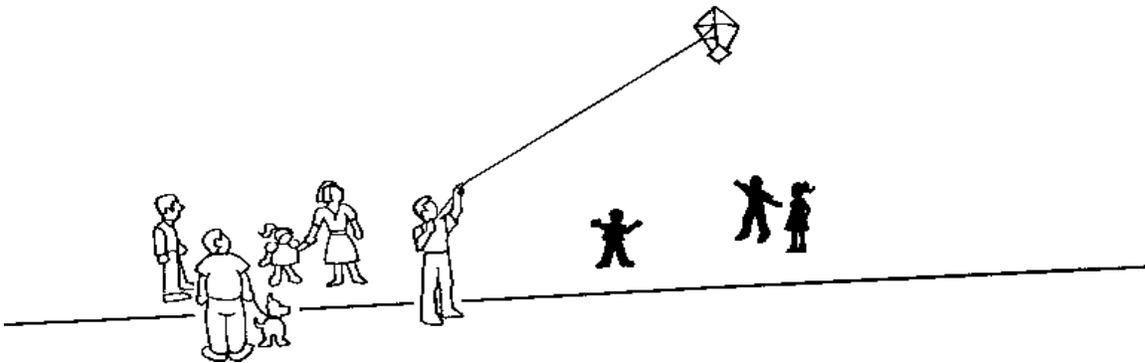


By the way, dry flylines also conduct electricity. No clouds, no rain ... same result. And even if you don’t get zapped, remember this: The power company carries 13,600 volts on lines less than two feet apart. In 1979, a kite dragged two of those lines together and burned down \$15,000,000 worth of Santa Barbara, California.

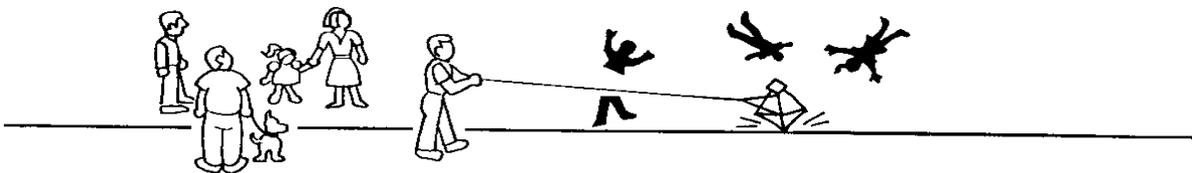
Most important of all, **watch out for people**. A typical situation that develops into a hazard looks like this: It's a beautiful day - just you, your kite, and a perfect wind. Soon your aerobatic prowess attracts spectators. Their "oohs" and "aahs" go straight to your head, and in no time at all, you're putting on a real show.



Some children, attracted by the motion and bright color, decide to chase your kite. Your ego tempts you to show off by chasing them back. You dive on them and make them fall down laughing while the crowd applauds. You think everyone is having great fun. The problem is, you may not know it or believe it, but you're in TROUBLE.



Because - no matter how good you are, no matter how good you think you are, you're not good enough...



You turn into an instant jerk...

It doesn't matter that you got away with it the last 100 times, or the last 1,000 times you tried it. It only takes once to hurt someone badly.

Teasing bystanders with a maneuverable kite is one of the greatest temptations in the world. We've all done it - and we should all know better. Think about one of those spars hitting someone in the eye. Think about catching an earring with your flying line. Please, just think about it. And then don't do it.

So when you get into a situation like this - and you will — LAND. Explain the danger to the children and their parents. People will understand. Tell them the best place to watch is up behind the flier.

Get the area under your kite clear, then resume flying. That way you can put on a dazzling show and be responsible at the same time. Your spectators will really be impressed.

Fighters are mobile, which means they can move around the flying field in order to avoid each other. That's not the case with many large show kites. Because you are flying vertically quite a bit, it is also easy to quickly come into contact with fast moving stunters before they even realize you are there.

If you are in an area where "stationary" kites are being flown, watch out for their lines -- especially the ones that are tied down and unattended. Stunt fliers should have their own area and you should have your's. Fighters are more fun when flown together anyway.

The point is that getting angry with other fliers isn't the answer. Communication and foresight is.

To sum it all up, share the flying space. Talk to people. Be alert. Be careful. Always remember the three "C's" of responsible kiting:

Caution, Courtesy, and Common Sense.

Unless you enjoy nasty letters from lawyers and insurance companies, pay close attention to what you're doing just as you would when driving a car, flying a plane, or operating any other potentially hazardous device.

Some parks and beaches are now beginning to limit or even prohibit kite flying. This is a direct result of irresponsible fliers who monopolize space or needlessly frighten and injure people. Kites are not dangerous, but some kite flyers are.

For these reasons, liability insurance has become a major issue for kite clubs and groups sponsoring stunt kite events. These new expenses may actually force the cancellation of some contests.

The most important thing that kite enthusiasts can do to ensure the future of the sport is concentrate on safety and courtesy.