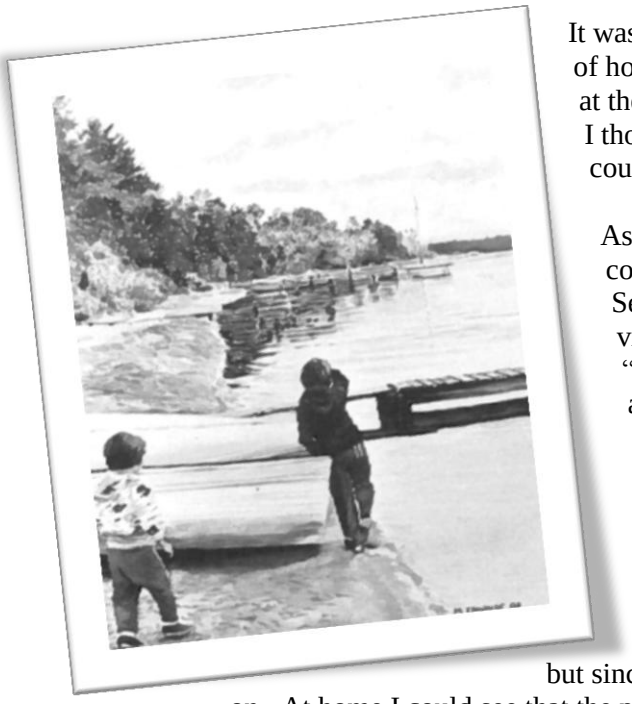
When the Wind Blows



It was a hot day for early July, one of a seemingly endless string of hot days, so when I finished my errands in town, I stopped off at the lake for a cool dip. But a thunder boomer was rolling in, so I thought it best to head on home. Not as good as a swim, but I could take a shower there.

As I approached the big curve by the church, I became concerned over the ominous look of the clouds over head. Severe thunderstorms with downdrafts or tornadoes can be visually identified as they approach by clouds known as "mammatus" which occur on the underside of the storm's anvil cloud. Downdrafts are shafts of cold dense air that accelerate downward, hit the ground, and splatter outwards. Because thunderstorms usually are moving and each downdraft takes several minutes to form, the resulting damage fields are oval in shape and elongated in the direction of storm movement.

I briefly considered pulling over rather than continuing, but since there was only a mile left to my house, decided to press on. At home I could see that the power was already out, because the heavy garage door would not respond to my door opener.

I thought of parking nearer the house, but was worried lest hail get my car. So I struggled with the garage door, and got my rig into the garage. By then I was soaked by the rain, and it had, indeed begun to hail. The rain came in heavy waves, the sound of the hail amplified by the tin roof. When the big spruce trees began to dance from the winds, I thought I would be better off in my basement than in the garage. But I also thought I might not make it to the house without a tree striking me, so I stayed put. Ironically, it had only been a couple of weeks since I had chewed out my husband for standing in a garage and watching trees fall during a storm.

It seemed to last a long time, but really it wasn't all that long; perhaps 20 minutes or so. Seemingly ferocious, this storm was not nearly as violent near my home as it was elsewhere. Characterized as a thunderstorm with downdraft winds of 60-80 mph, it created a swath roughly 15 miles wide and 70 miles long along a section of the U.S. Highway 2 corridor running from Bemidji to Grand Rapids, affecting multiple communities in between. Trees that had stood through storms for the past 100 – 200 years were uprooted or broken by this storm.

As a biologist, storms fascinate me. They are a part of the ecology of our north woods, and are a key shaping factor in plant communities. But as a human being, severe storms make me sad. There is so much destruction to our lives. Homes are wrecked. Businesses are affected. Lives are altered. Storms can change the landscape and our favorite places, seemingly forever, given the relative lifespan of people compared to the development of a forest.

When I was a child, my folks used to take us for vacations in the pine woods of Pike Bay within the Chippewa National Forest. Our family stayed in what we called the upper cabin; my grandmother stayed in the lower cabin. Our cabins were rustic. There was electricity, but no indoor plumbing. No TV's; no telephones. We popped popcorn in the big stone fire place. We drank root beer from tin cups. We played

for endless hours on the beach, and went for long walks in the woods. My love of the Chippewa has its foundation in these times.

My mother wanted to know how this special place fared during the July 2nd storm, so I went to take a look. The upper cabin was fine. You could not tell a storm had happened. But the lower cabin was a disaster area, with large red pine uprooted or snapped, lying all over the place. A big tree covered what used to be a shed. The cabin owner was repairing damage to the front of his place.

Wind can have an awesome power; the vagaries of its path are not always immediately understood. Initial data suggests the storm track covered 242,300 acres within the Chippewa National Forest (CNF) boundary, of which 134,300 acres are national forest system land managed by the CNF with 43,000 acres of the national forest land sustaining moderate to severe damage.

The physics of wind and trees is interesting, and is explained in a book by University of Minnesota professor Lee Frelich. As wind speed increases, trees become more streamlined. First, the leaves turn so that their sides are in line with the wind, which minimizes their surface area. Next, small branches bend in such a way that twigs begin to line up in front of each other. Finally, larger branches bend and become streamlined in the wind so that the entire outline of the trees' crown presents a minimal surface area to the wind. Some conifers can reduce their surface area by 45% in a wind. At some point, however, no more streamlining can be accomplished.

Wind is more likely to topple larger trees than smaller ones. Larger trees have less flexible trunks, so they are more likely to snap or uproot, because they are less able to bend. Large trees are much more likely to have decay of some sort, which acts as a weak spot when the wind blows. Additionally, wind speeds are higher in the upper canopy where the crowns of large trees reside, than in the understory.

Soil type and rooting depth also have a major effect on chance of windthrow. Sandy soils provide the greatest stability. Our pine communities are usually associated with sandy soils.

The July 2nd storm damage I have observed varies in intensity across the landscape. Some parts of the forest are barely touched; in other places I have seen all species of trees, and all ages of trees, affected. That is a reflection of the strength of the wind. As a wildlife biologist, the wind damage to our mature conifer communities concerns me more than the damage to the aspen-birch, due to the relative rarity of these communities and the wildlife habitats they represent.

People have been asking what such storms do to wildlife. That's a pretty big question, and one I only have partial answers to at this point. I can tell you that 21% of the Chippewa's eagle territories occur within the area currently classified as "affected" by the storm. Most of the eaglets were likely still in their nests on July 2nd, or in the process of fledging. The supercanopy red and white pine that hold these nests were quite susceptible to such a strong wind event, so it's likely that many nest trees ended up on the ground. The fate of the chicks and even adult eagles in such a strong wind may well not be positive.

On the flip side, dying and stressed pine trees attract boring insects. Although this is not generally viewed positively from a timber management perspective, some wildlife species are well adapted to take advantage of the increase in habitat suitability that results for them when large-scale events of this nature take place. One example is the black-backed woodpecker. This northern woodpecker is relatively rare on the Chippewa. Populations will irrupt when the bugs increase.

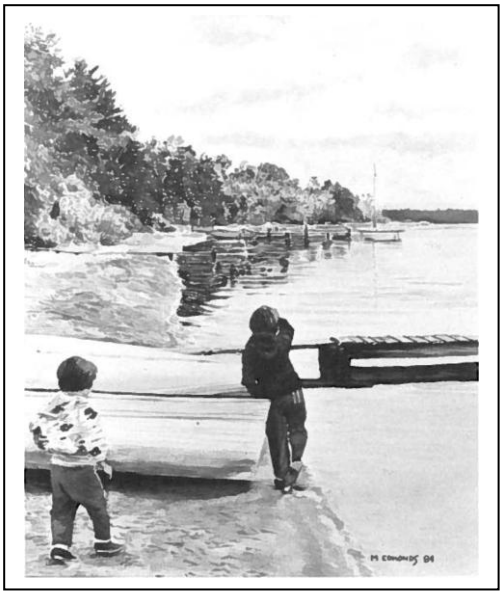
The most complete answer to the question about what such storms do to wildlife lies in what happens across the landscape over the longer term. Conifer forests are not prevalent on the modern landscape, due to changes that occurred during turn of the century logging and settlement. Today's northern forests are

younger and dominated by early successional hardwoods (aspen and birch) rather than by the old-growth pines and other conifers that preceded them.

What this means for wildlife is that wildlife species associated with aspen-birch habitats tend to be relatively common species, such as white-tailed deer and ruffed grouse, which is a reflection of the fact that these habitats are prevalent across the modern landscape. In contrast, species associated with older conifer forests are much less common, and some are rare. Consequently, these species are more vulnerable when losses to their habitats occur. There are at least 42 species of conifer-dependent birds, which represents 33% of the 128 forest bird species in north-central Minnesota.

The response of the forest to wind events varies by forest community. A prolific sprouter, aspen will tend to be favored in mixed conifer stands that contain this species in the event of windfall, whether or not it is followed by salvage logging. If we want to retain the presence of conifer within these communities, it will be important to not only salvage the downed wood, but to also reforest and treat the sites appropriately so that aspen does not have a competitive advantage. It will take time to regain the older forests the wind took down, but a necessary first step will be to ensure the pine becomes established again. These activities will set the stage for conifer-associated wildlife to occur.

Some folks are asking about climate change and the July 2nd storm. Although any given storm event cannot be attributed to climate change, we know that the intensity of thunderstorms in Minnesota is increasing as our climate warms. The mixing depth of the atmosphere is getting higher. The result is more powerful convection and storm force. We should expect to have to deal with greater forest disturbance, as a result.



When the wind blows, we are reminded how little control we have over some things in life. It hurt my heart to see the changes at Pike Bay – all those magnificent, big pine on the ground. How precious now the painting my mother did of her little girls at play on the beach, next to a beautiful pine forest. It will sustain me while we work to help the forest recover.

Submitted by: Kelly Barrett
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