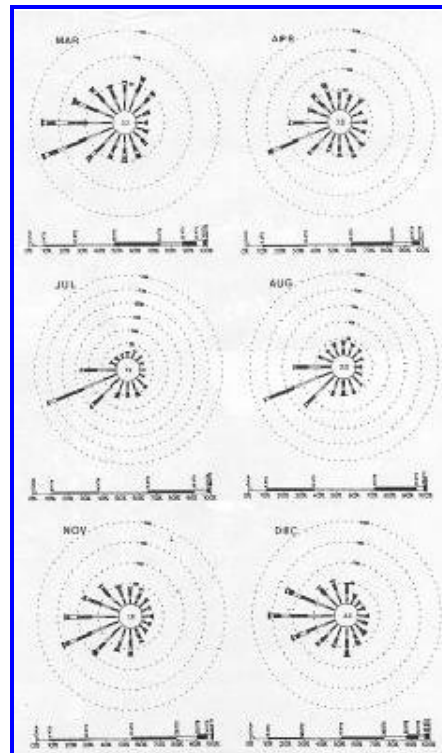
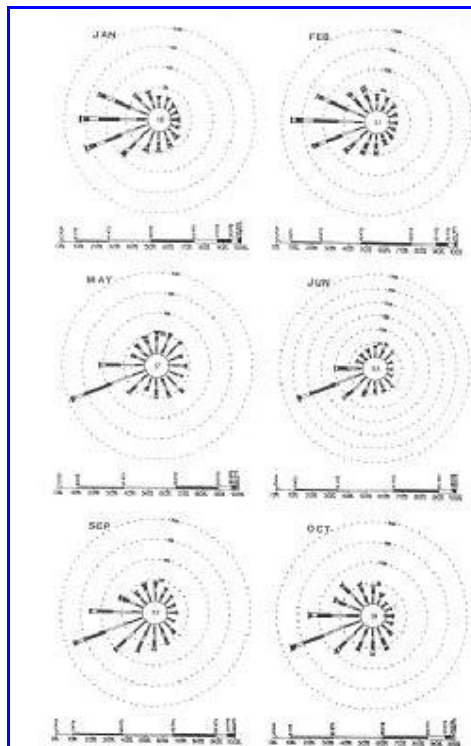
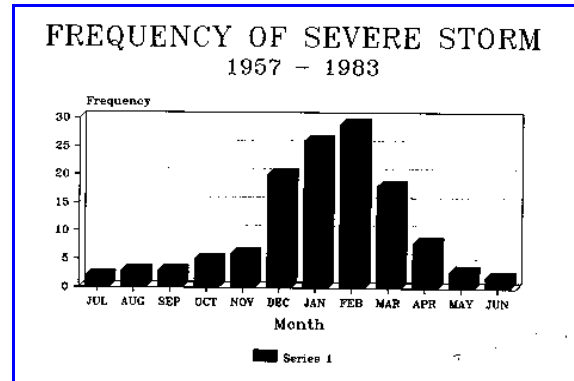


WIND THROW

Severe storms with wind speeds in the range 40-60 km/hr occur mainly in winter. But, considering the trees are anchored in frozen ground, these winter storms are not necessarily the ones which cause most of the wind-throw. In fact, if the deployment of arborists is any guide, they do most of their business in cleaning up after catastrophic wind-throw usually in September and October and very rarely in winter; i.e., before the ground is frozen.



The rose diagrams for wind speed and direction for the St. John's Airport are representative of most of the Avalon Peninsula. For summer months, the bars are thinner than for other months. This indicates that winds are predominantly benign and warm winds from the southwest. Beginning in September there is a distinctive shift toward brisk westerly winds and even stronger northwest winds in winter before they drift back toward the predominantly southwest winds. The frequency of strong northeast winds hardly registers on the rose diagrams, but their impact can be awesome in terms of catastrophic wind throw and blinding snow storms.

he impact of northeasterly gales on wind-throw of urban trees makes headlines only because a few cars get bashed in and some well-worn roof shingles get torn off. On the whole urban trees are wind-firm. The gales tend to cull out isolated weak trees and those growing in residential areas where the topsoil has been scraped off and none ever replaced.

A good example is the Carolina poplar which settled on a car. It is clear from the photo that its root system is small, brittle and very much out-of-balance for such a large tree. It is surprising this tree had not blown down long ago.



Exotic maples are among the most common urban trees planted on the Avalon. They are for the most part hardy and grow well in most urban sites. However, as shown in the photos below, maples and other species, are predisposed to producing bad crotches which occasionally split apart in strong winds.



Monoculture plantations of pine on exposed, poorly drained sites are susceptible to light endemic (sporadic) wind-throw by strong westerly winds when they reach about 30 years old. By the time the pine plantations are 50 years-old, wind-throw on the windward edges by strong northwesterly wind becomes serious. There are a few small larch plantations on the Avalon Peninsula that are 25-30 years. Most are wind firm, especially those mixed in with natural regeneration of native species of trees and tall shrubs. But wind throw caused by funnelling of storm winds into jets up narrow valleys is becoming a problem in one small Japanese larch plot planted in furrows and on an exposed ridge (see [AVONDALE](#)).

Massive amounts of blow-down in the forests across Newfoundland go unnoticed. In terms of landscape ecology, wind-throw is a continuous disturbance process controlling vegetation patterns in the landscape. Mature, even-aged balsam fir forests are the most susceptible to recurring windstorms - especially if they are insect-damaged stands or at forest edges around cut overs. In central Avalon, wind-throw of mature balsam fir forests on the ridges is on a huge scale.

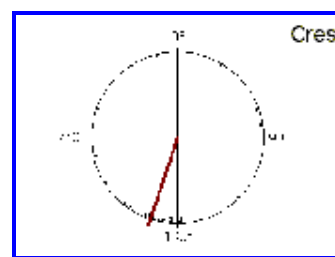
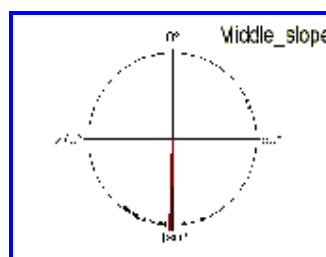
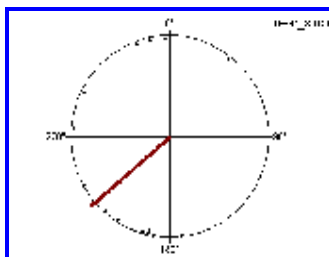


A wind-thrown mountain paper birch with a shallow root-plate reveals one of the problems with Cochrane soil; i.e., there is a cemented subsurface layer at about 15-20 cm deep which is impervious to large tree roots - thus reducing wind-firmness



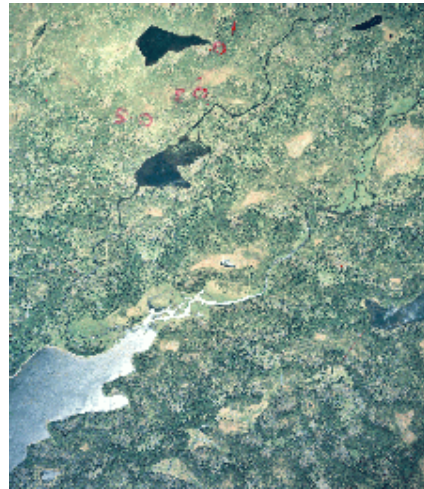
Wind-throw of mature, even-aged stands of balsam fir adjacent to Garland's Landing in the Clam River area of Central Avalon.

Circular statistics graphs showing the direction of wind-thrown trees adjacent to Garland's Landing in the Clam River area is caused by northerly and northeasterly gales. The red line indicates mean direction of wind-thrown trees.

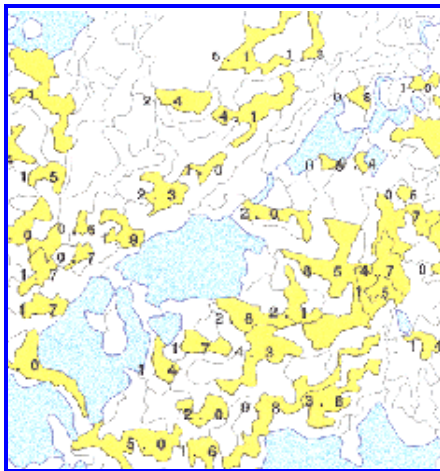




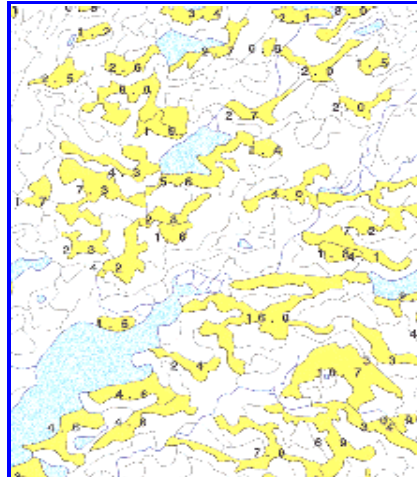
Wind throw on the ridges at Lockyer's Waters.



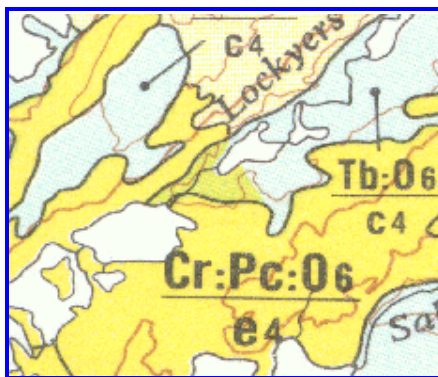
Wind throw on the ridges at North River:



Lockyer's Water: map of wind throw classes (the numbers are areas in hectares of wind throw patches).(Source: DFRA)



North River: map of wind throw classes (Source: DFRA)



Lockyers Water: soil series map (Source: DFRA)

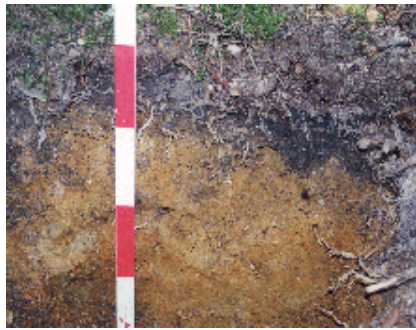


North River: soil series map (Source: DFRA)

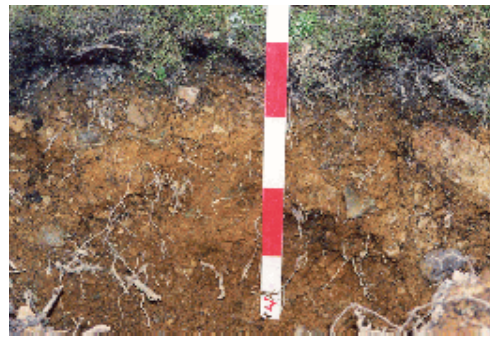
Most of the wind-throw is on Cochrane soils on the crest of ridges and Portugal Cove soils on mid-slopes. The soil is covered by a layer of well-decomposed organic matter.

The soils symbol **Cr:Pc:O6/e4** indicates that most of the wind-throw in Lockyer's Water occur on gently-rolling topography (**e**) with very stony soils (**4**). The most serious wind-throw appears to be on the Cochrane soil (**Cr**) predominant on the crests and upper slopes and in mid-slope where it blends into Portugal Cove soil (**Pc**). There are layers of well-decomposed organic layers (**O6**) throughout.

Cochrane soil is generally better drained than Portugal Cove soils. However, being slightly drier, means that Cochrane soils tend to develop a cemented upper layer which prevents large roots penetrating any deeper than 10 - 20 cm below the surface. Few fine roots are able to penetrate through soil fractures to a depth of 40-50 cm. Obviously, the root mass is too shallow on the Cochrane soils and to some extent on Portugal Cove soil to provide sufficient anchorage as the trees become taller.



Cochrane Soil: a very common soil developed under Balsam fir forest in central Avalon. Large roots are restricted to the 10 cm and only fine roots are able to follow minute soil fractures to a depth of 50 cm.(Photo: Rick St. Croix)



Portugal Cove soil: the soil is not cemented like the adjacent photo of Cochrane soil which means that larger roots can penetrate to greater depths and give better anchorage when trees become taller.(Photo: Rick. St, Croix)

There are many silvicultural strategies aimed at reducing wind-throw. In the case of Avalon Peninsula, it is necessary to start with soil preparation. Since Cochrane soils are the most common soil series on the Avalon and the most promising for forestry, a subsoiler to break up the fragipan (a cemented layer) is probably the best implement to encourage deeper rooting. In fact, Agriculture Canada Research Station in St. John's has imported a trench-less draining plough specifically designed for shattering rocks in soils like Cochrane soils. This may be the best implement for modifying soil conditions on wind throw sites regardless of whether the reforestation plan favours natural regeneration and/or planting.

Whether the objective is reforestation or afforestation plans have to include at the provisions for manipulating aerodynamic characteristics to create more wind-firm forests or simply to improve growth and yield. Mixed species shelterwood techniques for long rotations tend to be successful in improving overall site quality and wind-firmness.