

# Vermont Forest Health

## Tree Recovery from Frost Damage in Maple Sugaring Sites on State Lands

Department of Forests, Parks, & Recreation  
October, 2011

[vtforest.com](http://vtforest.com)

In 2010, a spring frost event caused widespread foliage injury to hardwoods in Vermont. Tree health was monitored in maple sugaring sites on State Lands to assess recovery from this damage. In 2010, and again in 2011, twenty mature sugar maple trees at each of six locations were evaluated using standard indicators of tree health. According to these indicators, most trees have recovered from the frost event.

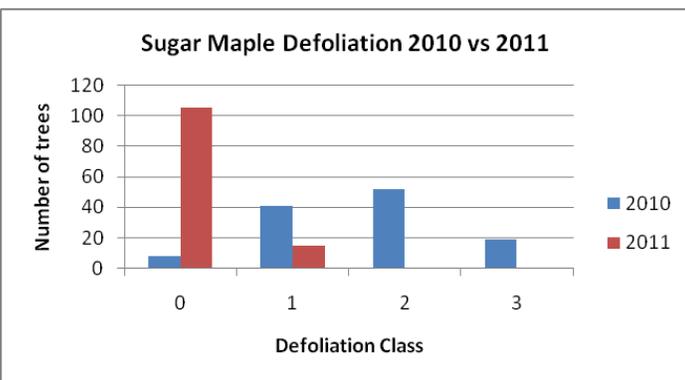
The following summarizes data from all six sites.

### Defoliation

The defoliation indicator measures the loss of leaf area from insects, diseases or weather events. Frost injury in 2010 resulted in leaf browning, smaller leaves, or absent leaves. Defoliation was recorded as 0=no defoliation, 1=trace to light (<30% defoliation), 2=moderate (30-60%), or 3=heavy (>60%). In 2010 over half the trees had moderate or heavy defoliation. However, in 2011, very little defoliation was recorded. Tree health improvements would be expected with this return to normal leaf area.

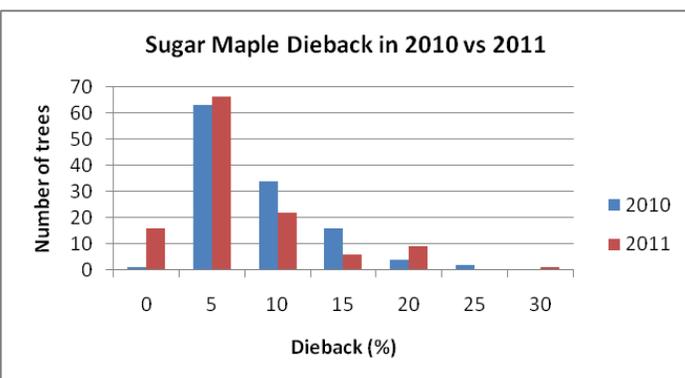


*Over half of the sugar maples had moderate or heavy defoliation in 2010.*



### Dieback

The dieback indicator quantifies new dead twigs, and indicates current or past stress effects on tree health. Dieback in the leased sugarbushes improved from 2010 to 2011, with an increase in trees with 0-5% dieback, and a decrease in trees with 10-15% dieback. A few trees remain with 20-30% dieback. These trees may require more time to recover, or may be unhealthy due to other causes.



*Dieback indicates current or past stress effects on tree health.*



## Foliage Transparency

The foliage transparency indicator measures the density of foliage, reflecting current year stress. The higher the transparency rating, the greater the impact on current year growth. Normal sugar maple transparency is 20% or less. Transparency improved substantially at all six maple sugaring sites. By 2011, most of the trees that had thin, transparent foliage in 2010 had recovered to normal levels.

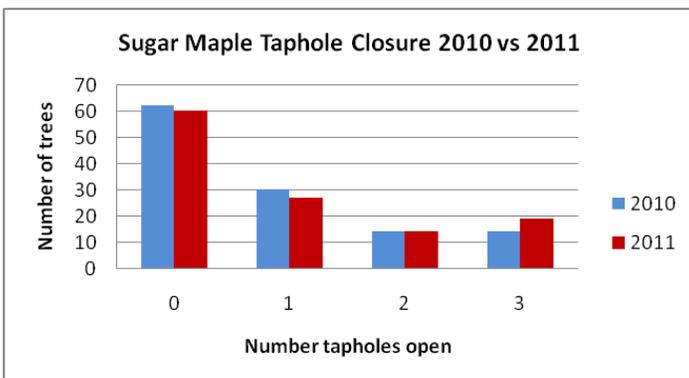
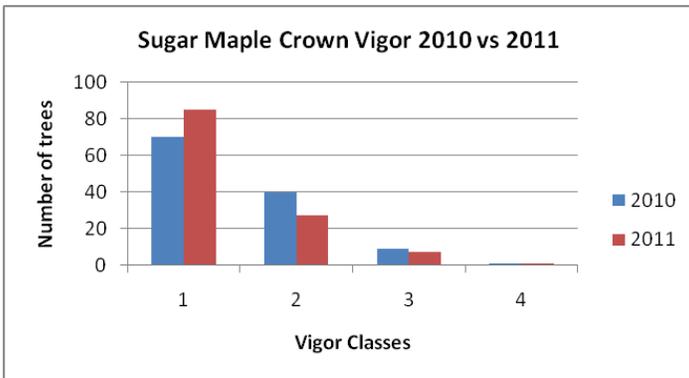
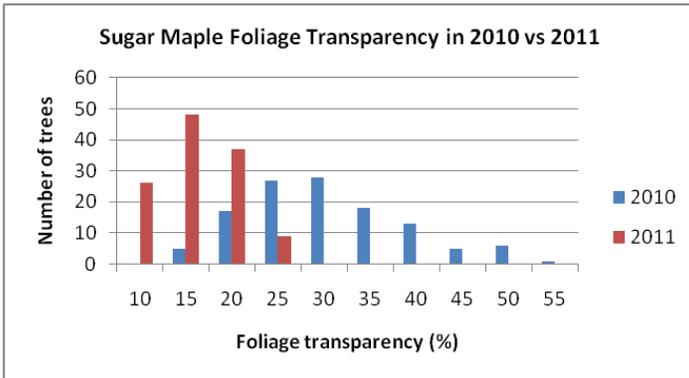
*Between 2010 and 2011, sugar maple foliage transparency improved at all six sites.*



## Crown Vigor

Crown vigor is a general measure of branch health, broken or missing branches, and the ability of the crown to support tree growth. The 4 categories of tree vigor are: 1=healthy, 2=light decline, 3=moderate decline and 4=heavy decline. The number of trees in the healthy class increased from 2010 to 2011, but a third of trees remained in some stage of decline. Some of these may have been unhealthy, due to other causes, prior to the frost event. Trees with poor crown vigor are at risk of continued decline.

*Some trees with poor crown vigor may have been unhealthy from other causes.*



## Taphole Closure

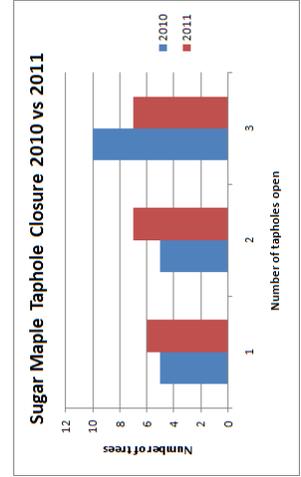
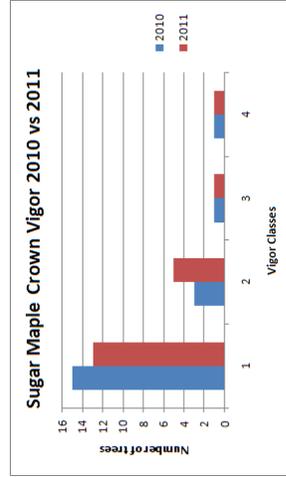
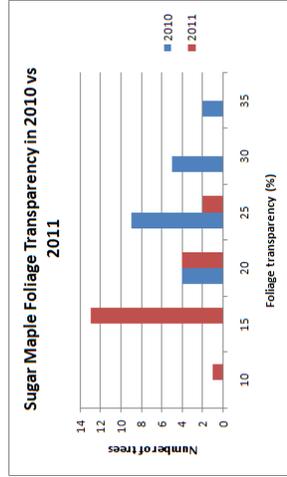
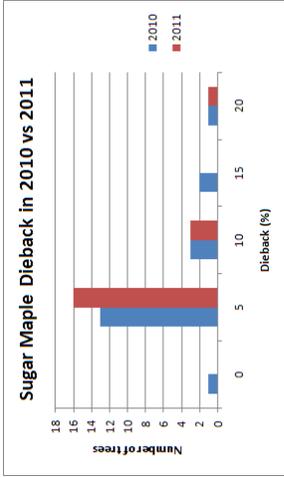
Taphole closure is an external indicator of radial wood growth. When trees are under stress, radial growth is one of the first functions to be compromised. Ideally tapholes would close rapidly, indicating robust growth. In both 2010 and 2011, half the trees grew rapidly enough to completely close tapholes between the time they were tapped in late winter and the summer evaluations in July or August. The other half grew more slowly, indicating less than optimum tree health.



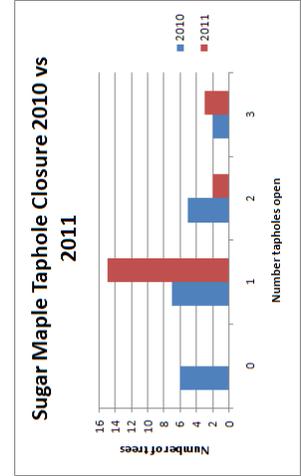
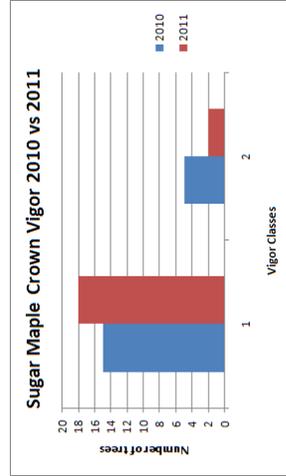
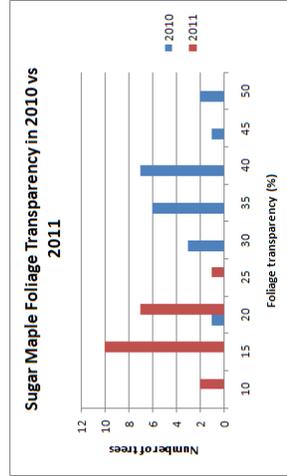
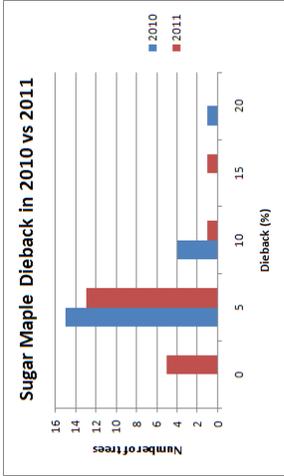
*When trees are under stress, radial growth, indicated by taphole closure, is one of the first functions to be compromised.*

# Sugar Maple Health Indicator Ratings for Six Maple Sugaring Sites on State Lands, 2010-2011.

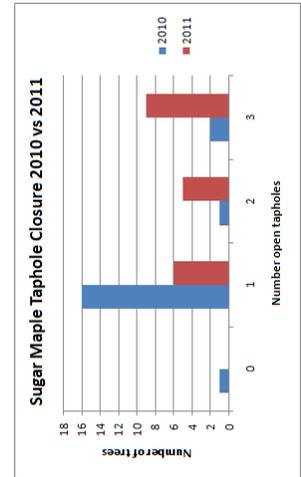
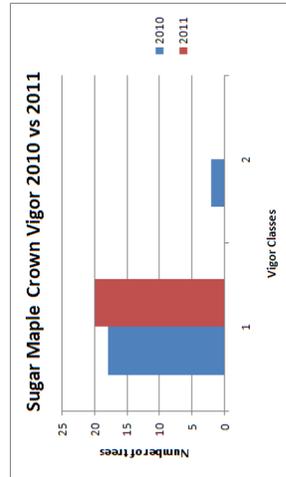
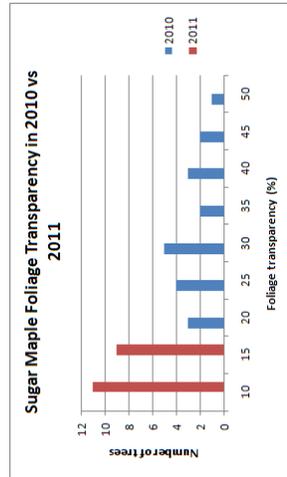
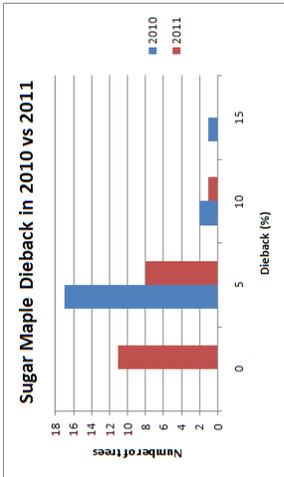
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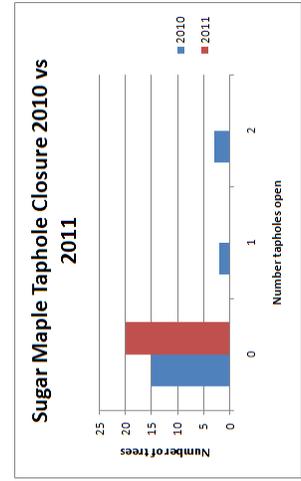
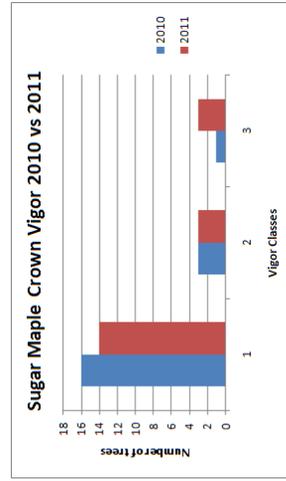
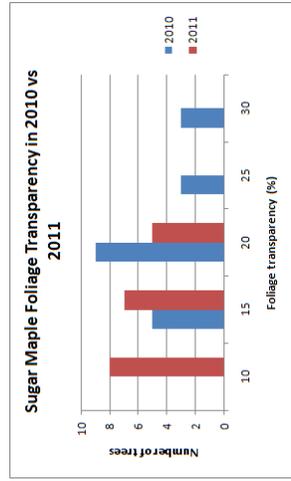
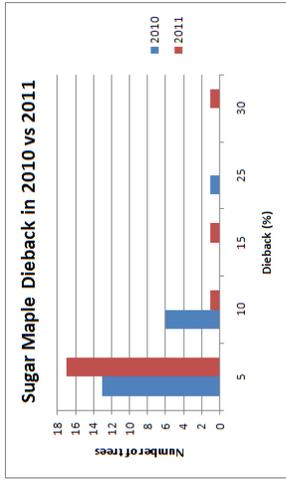
## Stowe



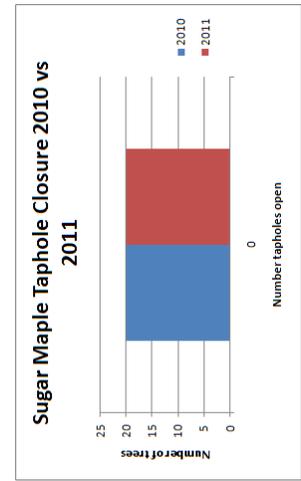
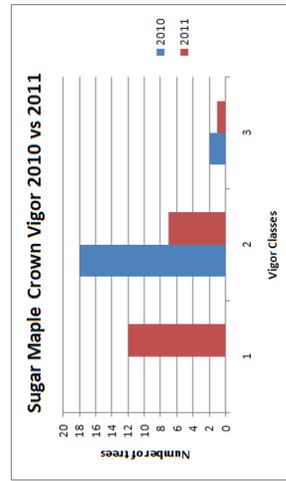
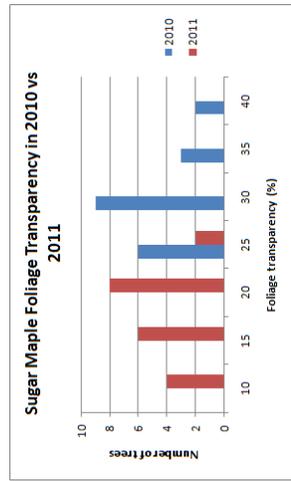
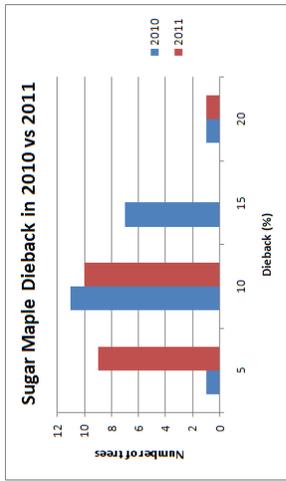
## Cambridge



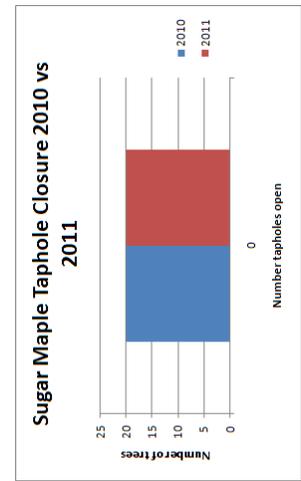
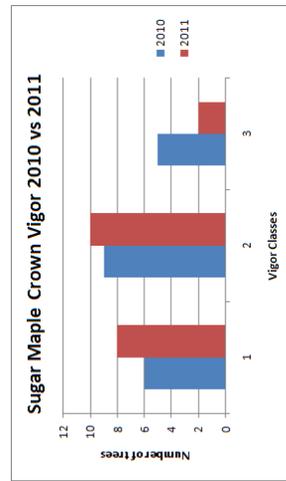
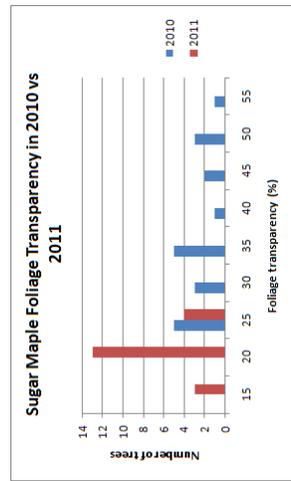
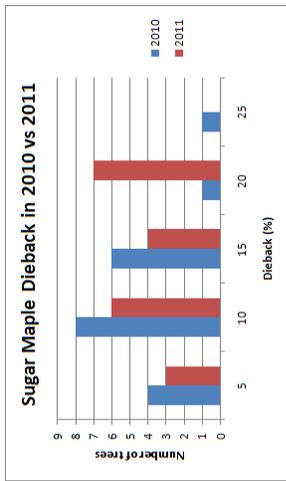
## Groton



## Mount Holly



## Andover



**For more information, contact the Forest Biology Laboratory at 802-879-5687 or:**

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