

Tree Pests and Damage

*Trends, Patterns, &
Lessons Learned*



Data collection and other program assistance provided by

The University of Vermont

US Forest Service NA State & Private Forestry

US Forest Service Forest Health Technology Enterprise Team

VT Agency of Transportation

Programs supported, in part, by the

US Forest Service Cooperative Forest Health Program

Data analysis and photos provided by Jim Duncan, Dan Dillner, Jen Pontius, Sandy Wilmot, Ron Kelley, Randy Morin, Josh Halman and others

Data Sources Include...

Aerial Forest Damage Detection Survey

VT Forests, Parks & Recreation and US Forest Service

VMC Forest Health plots

VT Forests, Parks & Recreation and University of Vermont

Pest Monitoring

VT Forests, Parks & Recreation, USDA APHIS, US Forest Service, VT Agency of Agriculture, University of Vermont

Forest Inventory and Analysis

US Forest Service

Aerial Detection Survey Method



Aerial Detection Survey Method



Aerial Detection Survey Method



Some Factors Affecting Results

Haze and Clouds

Wind and Turbulence

Timing of Survey

Severity of Tree Damage

Type of Damage

Amount of Damage

Uniformity of Host

Detail of Base Maps

Scale of Base Maps

Time of Day

Flight Pattern

Equipment Reliability

Pilot Skill

Aircraft Design

Airspeed

Observers' Skill

Observers' Knowledge

Observers' Stomach



2015 Beech Bark Disease

Damage areas detected and mapped by aerial sketchmap survey. Map indicates approximate location of damage



2015 Birch Defoliator Complex

Damage areas detected and mapped by aerial sketchmap survey. Map indicates approximate location of damage



2015 Balsam Woolly Adelgid Related Decline

Damage areas detected and mapped by aerial sketchmap survey. Map indicates approximate location of damage



2015 Drought Damage

Damage areas detected and mapped by aerial sketchmap survey. Map indicates approximate location of damage



2015 Wet Site Related Decline

Damage areas detected and mapped by aerial sketchmap survey. Map indicates approximate location of damage



2015 Hardwood Chlorosis

Damage areas detected and mapped by aerial sketchmap survey. Map indicates approximate location of damage



2015 Frost Damage

Damage areas detected and mapped by aerial sketchmap survey. Map indicates approximate location of damage



2015 Brown Spot Needle Blight

Damage areas detected and mapped by aerial sketchmap survey. Map indicates approximate location of damage



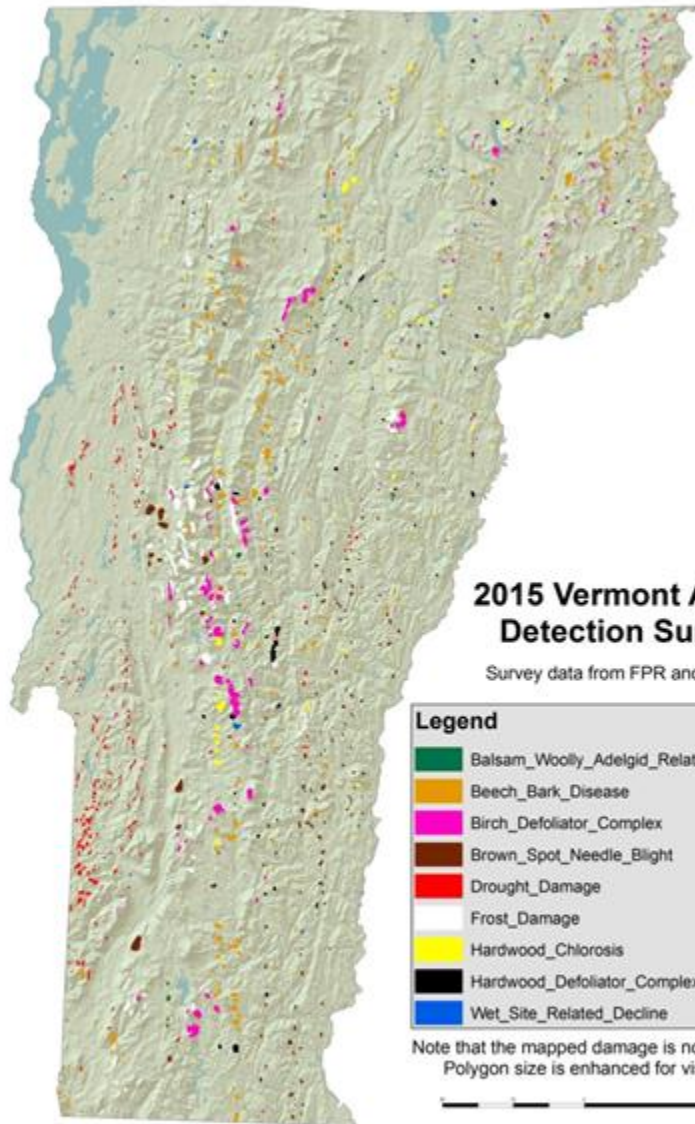
Providing the information needed to understand, manage, and protect Vermont's forested ecosystems in a changing global environment

Long-Term Monitoring Update 2014



Published December 2, 2015





2015 Vermont Aerial Detection Survey

Survey data from FPR and USFS

Legend

	Balsam_Woolly_Adelgid_Related_Decline
	Beech_Bark_Disease
	Birch_Defoliator_Complex
	Brown_Spot_Needle_Blight
	Drought_Damage
	Frost_Damage
	Hardwood_Chlorosis
	Hardwood_Defoliator_Complex
	Wet_Site_Related_Decline

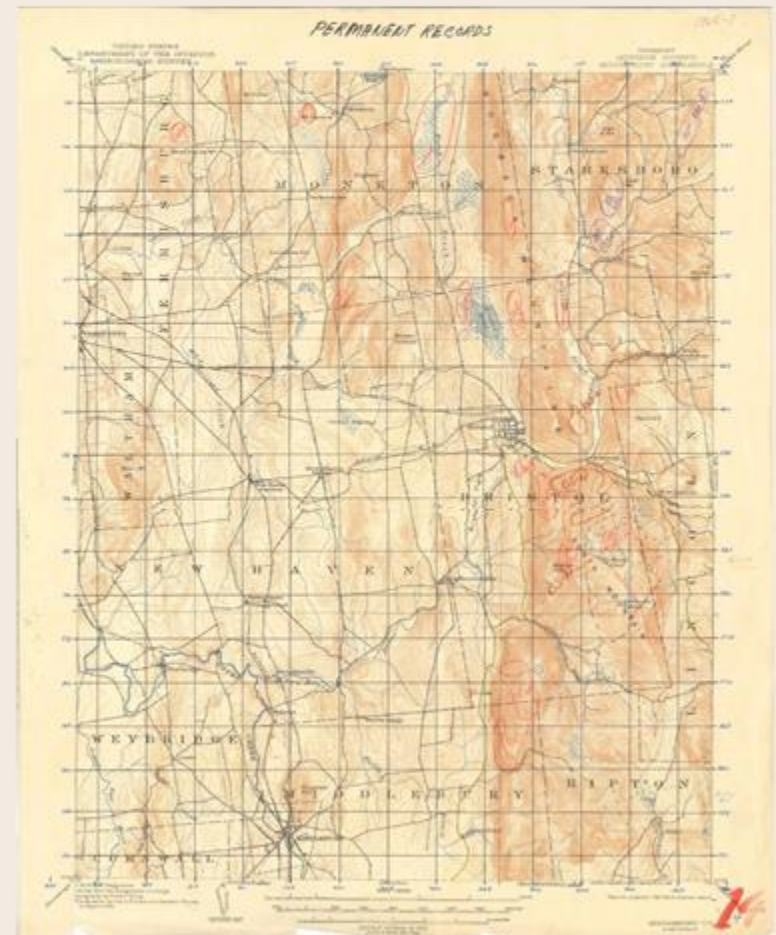
Note that the mapped damage is not to scale;
Polygon size is enhanced for visibility.



Diener 2015

Maps go back to the 1960's.

Data from 1985 to the present
is in the VMC database.

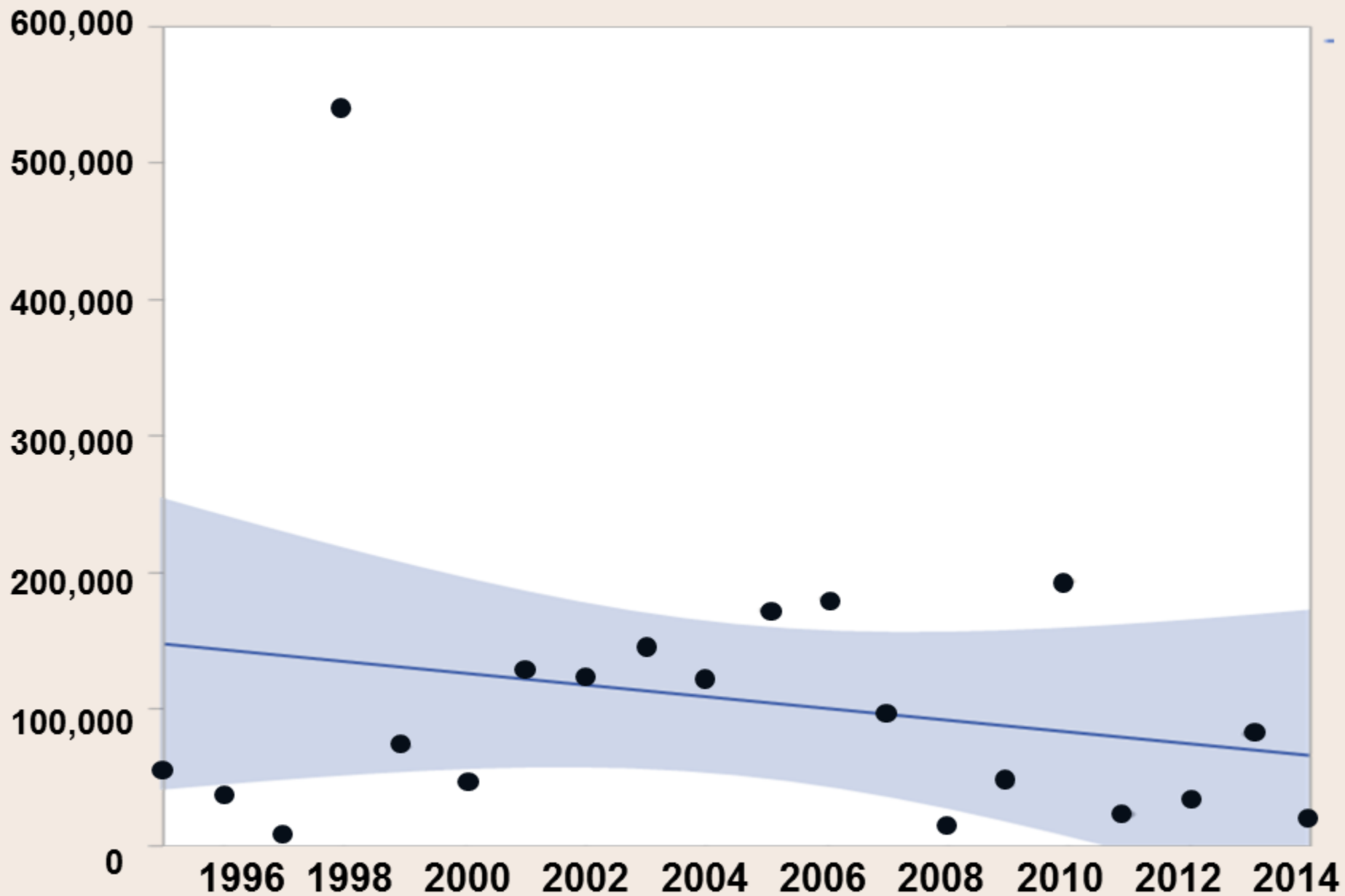


Alder Leaf Beetle
Anthracnose
Anthracnose/Insect Defoliators
Apple Scab
Arborvitae Leafminer Damage
Arborvitae Mortality
Ash Decline
Balsam Woolly Adelgid Related
Decline
Beaver Damage
Beech Bark Disease
Birch Decline
Birch Defoliators
Brown Spot Needle Blight
Brown Spot Needle
Blight/Anthracnose/Insect
Brown Spot Needle Blight/Beech
Bark Disease
Brown Spot Needle Blight/Birch
Defoliator Complex
Bruce Spanworm
Cedar Symptoms
Cherry Scallop Shell Moth
Construction Damage
Drought Damage
Dutch Elm Disease
Fall Cankerworm
Fall Webworm

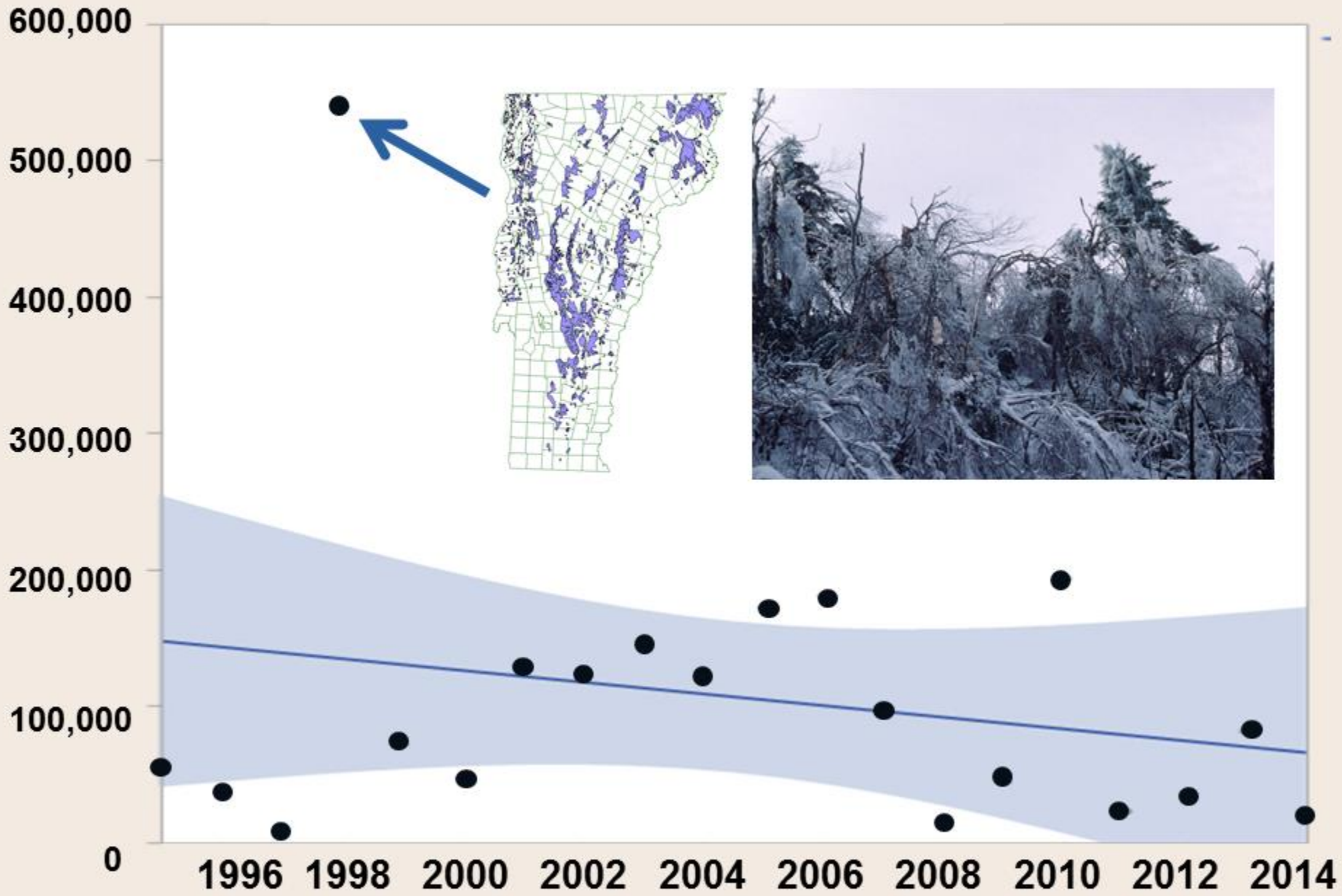
Fire
Forest Tent Caterpillar
Forest Tent Caterpillar Related
Decline
Frost Damage
Gypsy Moth
Hail Damage
Hardwood Chlorosis
Hardwood Decline
Hardwood Defoliator Complex
Heavy Seed
Hemlock Looper
Hemlock Looper Related Decline
Hemlock Mortality
Hemlock Woolly Adelgid
Ice/Snow Damage
Larch Casebearer
Larch Decline
Larch Needlecast
Large Aspen Tortrix
Locust Leafminer
Logging Related Decline
Maple Leaf Cutter
Mouse Damage
Oak Decline
Oak Defoliator Complex
Oystershell Scale
Pear Thrips

Pine Needlecast
Pine Shoot Moth
Poplar Leaf Fungus
Poplar Symptoms
Porcupine
Red Pine Symptoms
Saddled Prominent
Softwood Defoliation
Spruce Budworm Related Decline
Spruce Winter Injury
Spruce-Fir Decline
Striped Alder Sawfly
Unknown
Unknown Defoliator
Wet Site Related Decline
White Pine Blister Rust
White Pine Needlecast
White Pine Symptoms
Willow Decline
Willow Defoliation
Wind Damage
Winter Injury

Total Damage Hectares Mapped



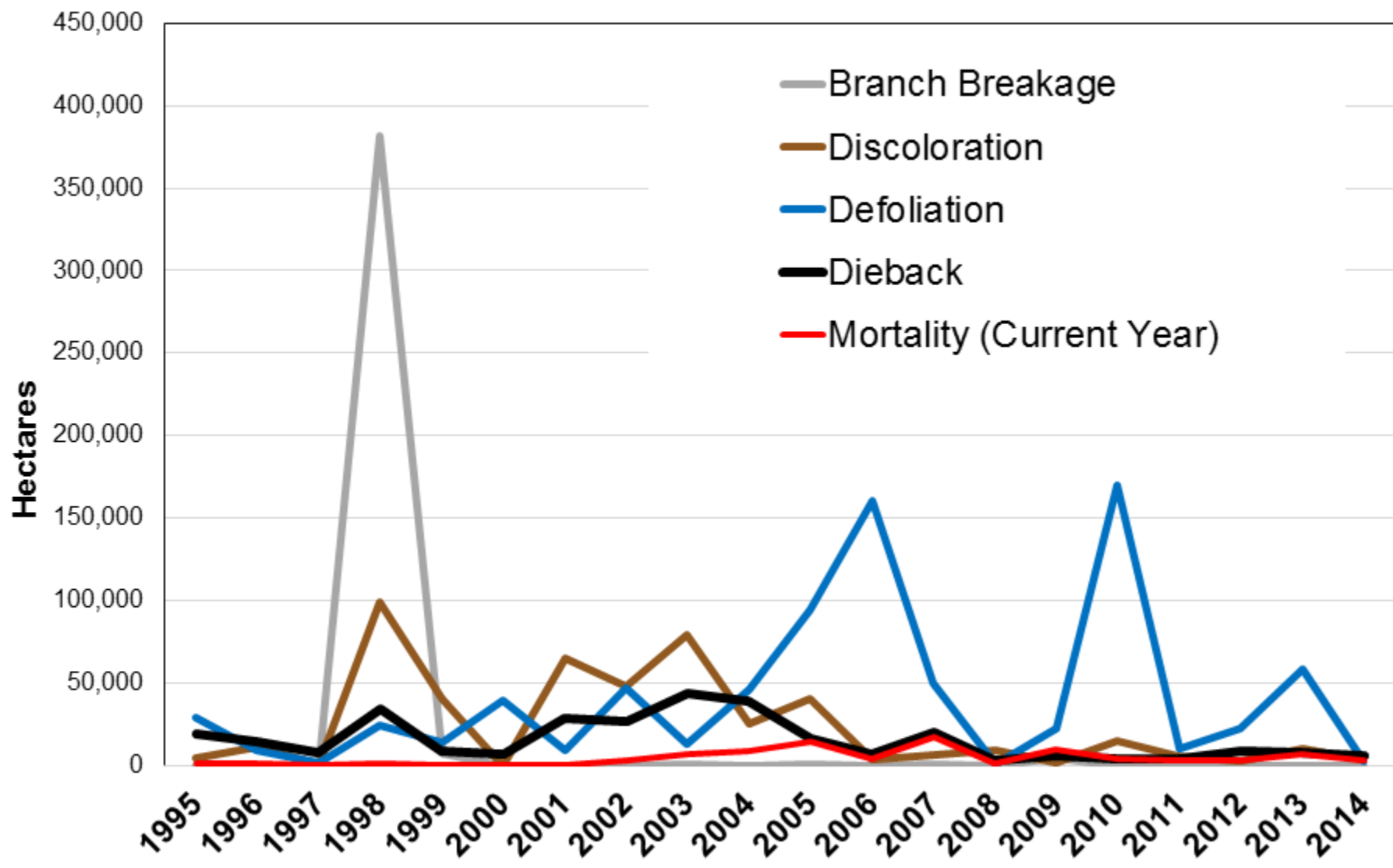
Total Damage Hectares Mapped



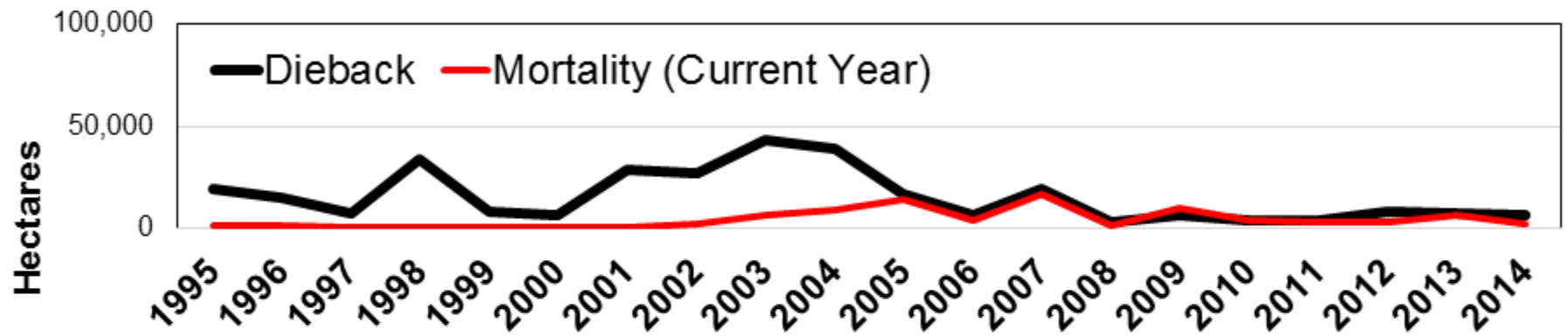




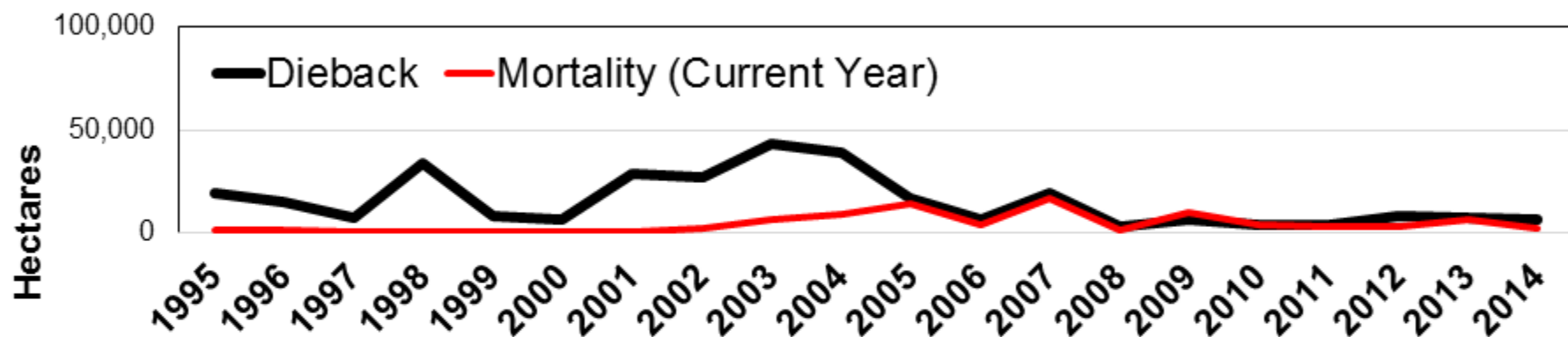
Damage Types Mapped by Year



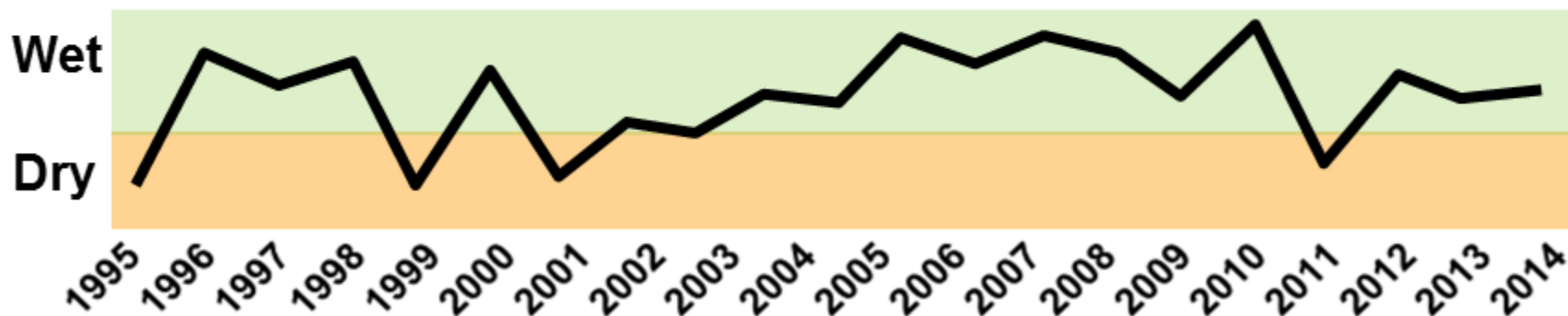
Total Decline Symptoms Mapped by Year



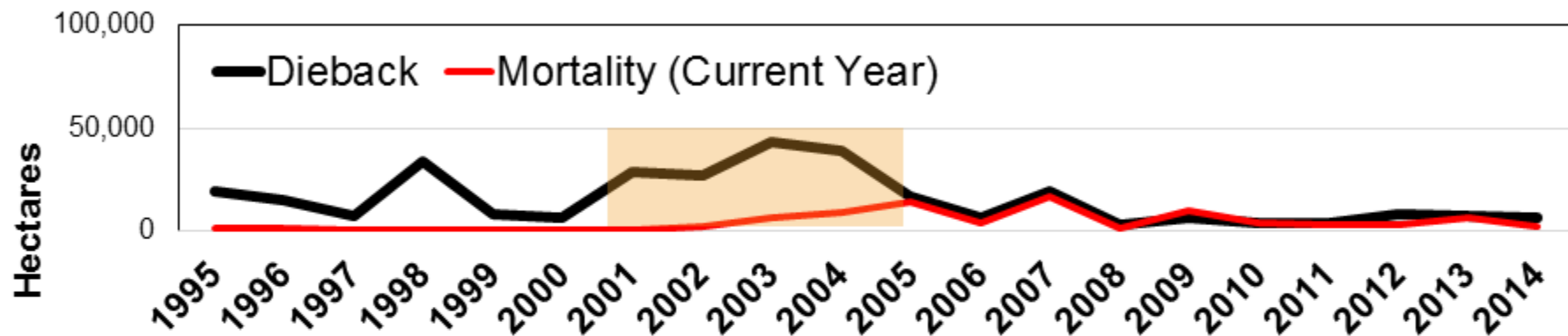
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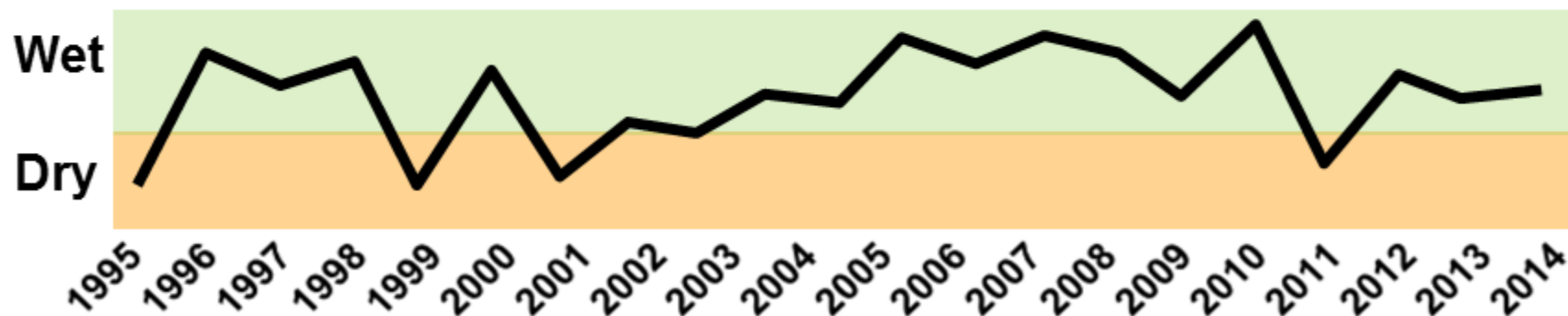
Palmer Drought Severity Index (June – August)



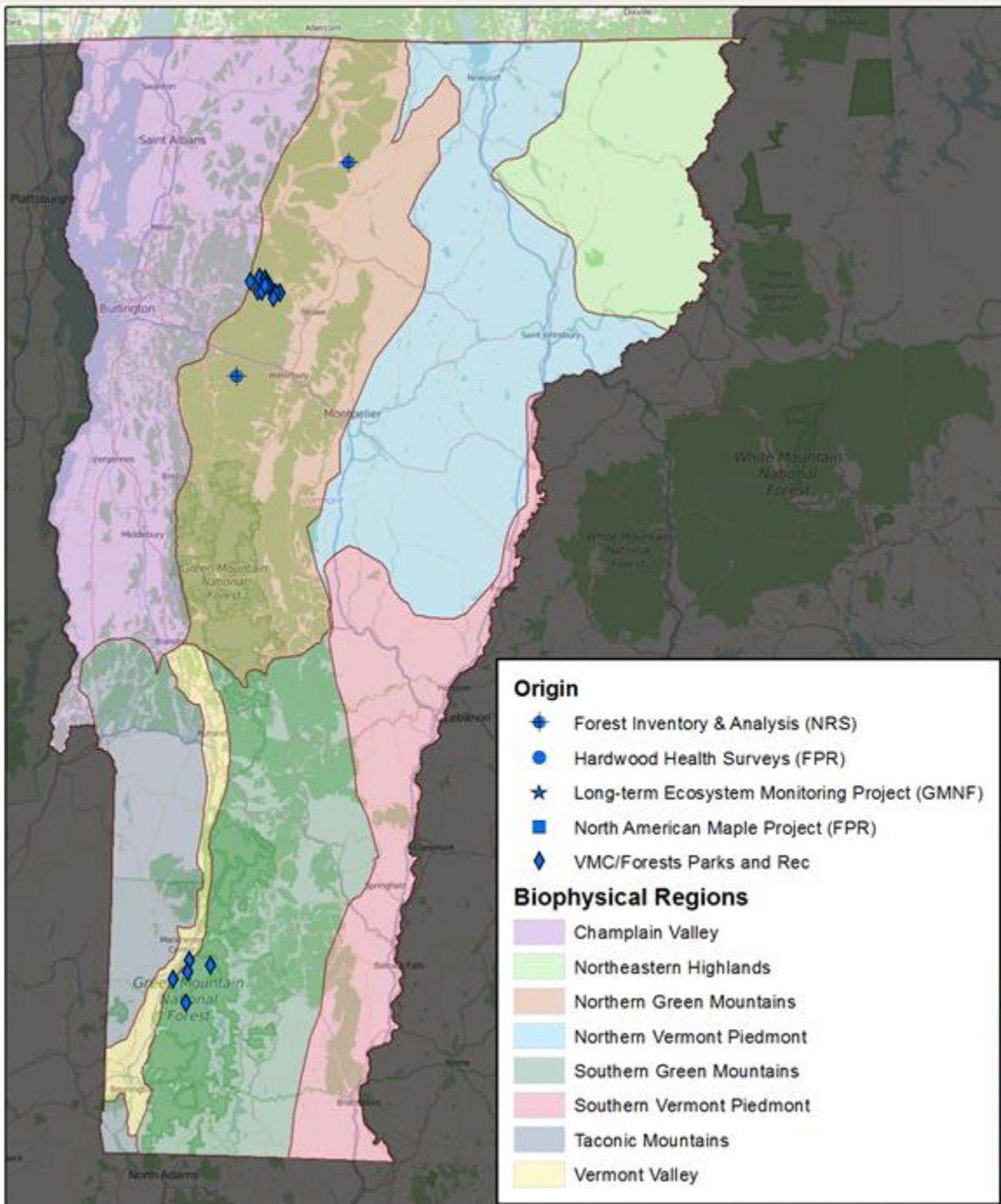
Total Decline Symptoms Mapped by Year




Palmer Drought Severity Index (June – August)

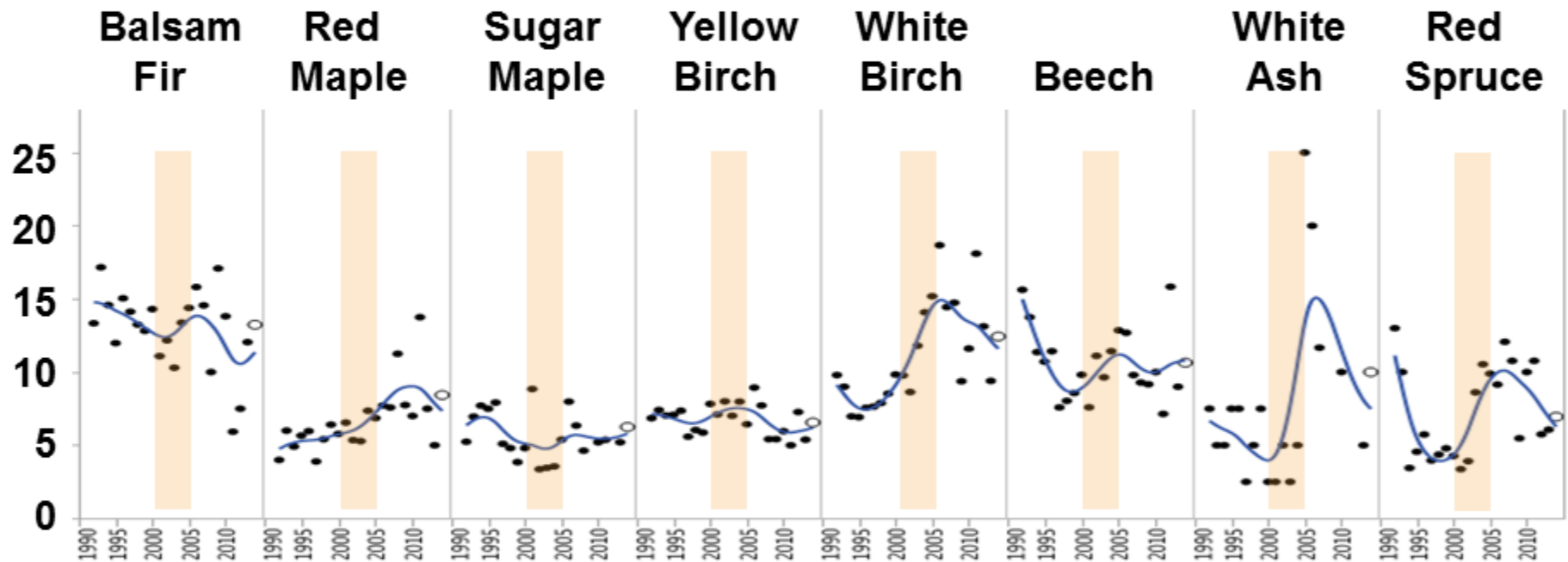


VMC Forest Health Monitoring Plot Network: 2014



VMC Plot Mean Dieback by Species: 1990-2014

 = 2001 - 2005



Hardwood Decline

Mapped in 17 out of 20 Years

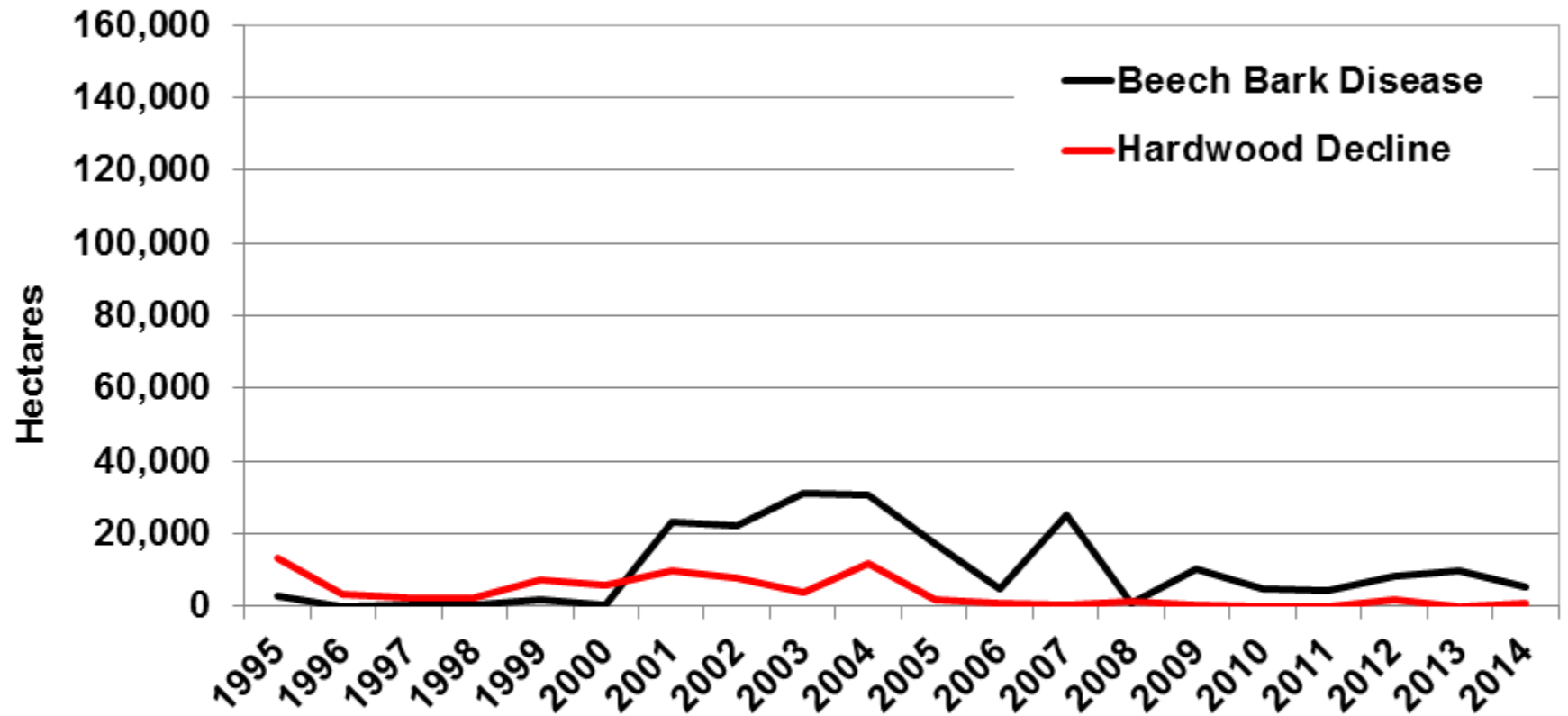


Beech Bark Disease

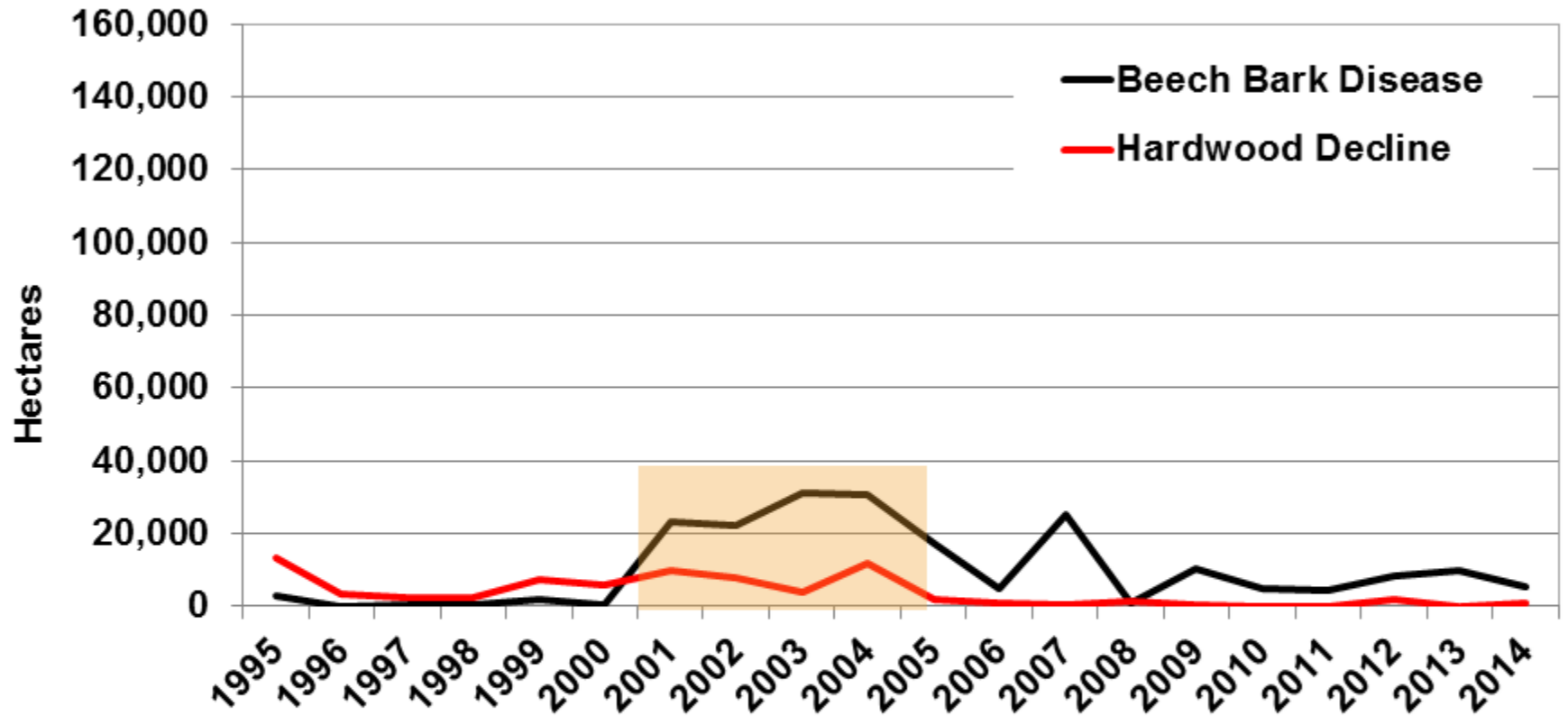
Mapped all 20 Years



Select Tree Declines Mapped by Year

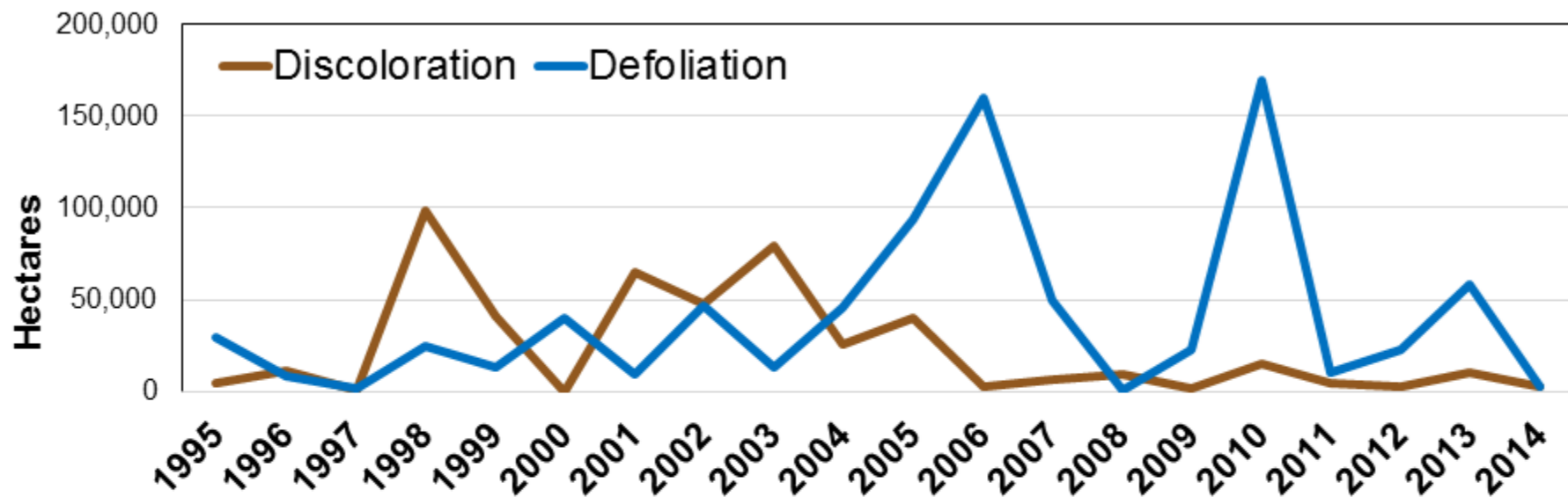


Select Tree Declines Mapped by Year





Total Foliage Damage Mapped by Year



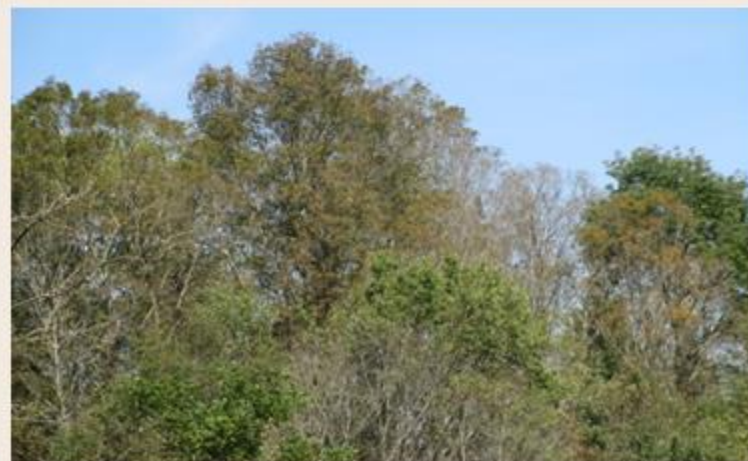
Drought Damage

Mapped in 12 of 20 Years



Anthracnose

Mapped in 9 of 20 Years



Forest Tent Caterpillar

Mapped in 4 of 20 Years



Birch Defoliators

Mapped all 20 Years



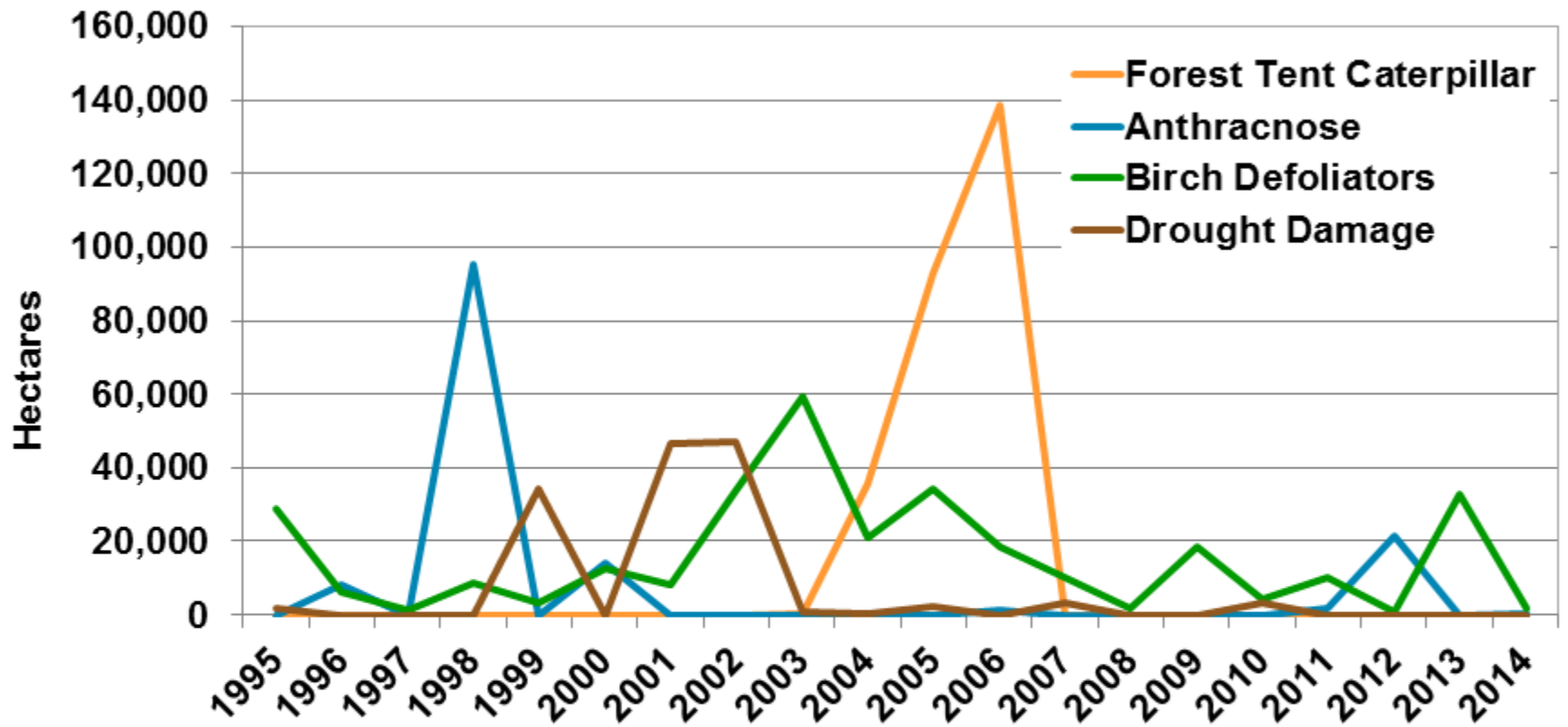
Septoria Leaf Spot



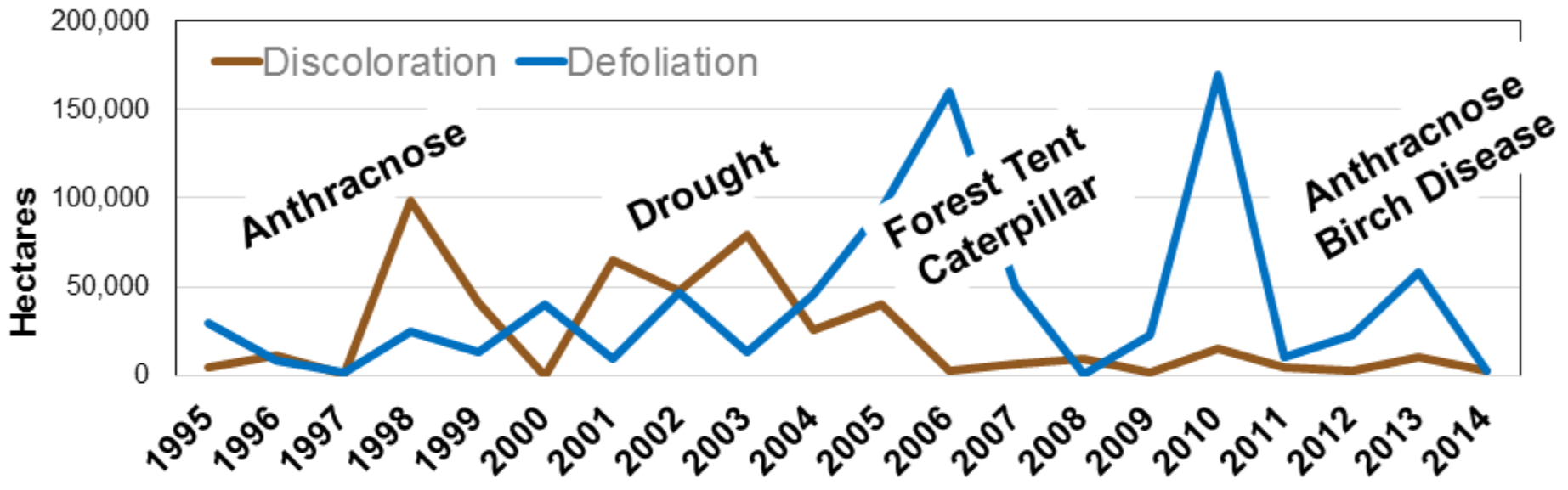
Birch Leaf Mining Sawflies



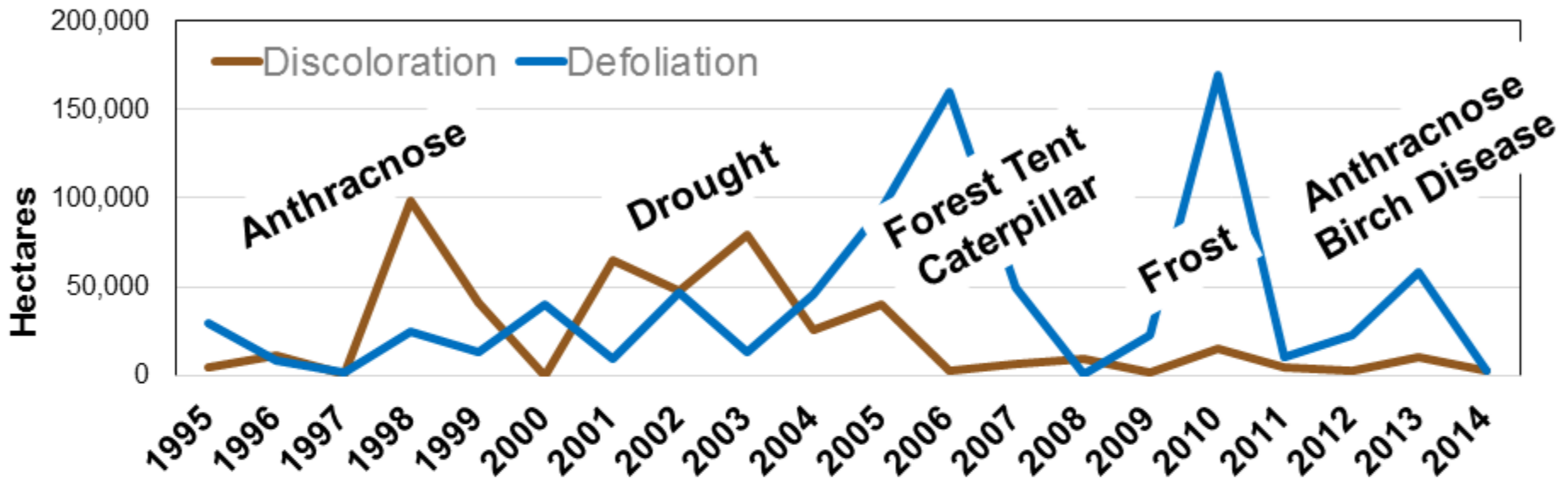
Select Foliar Damage Agents Mapped by Year



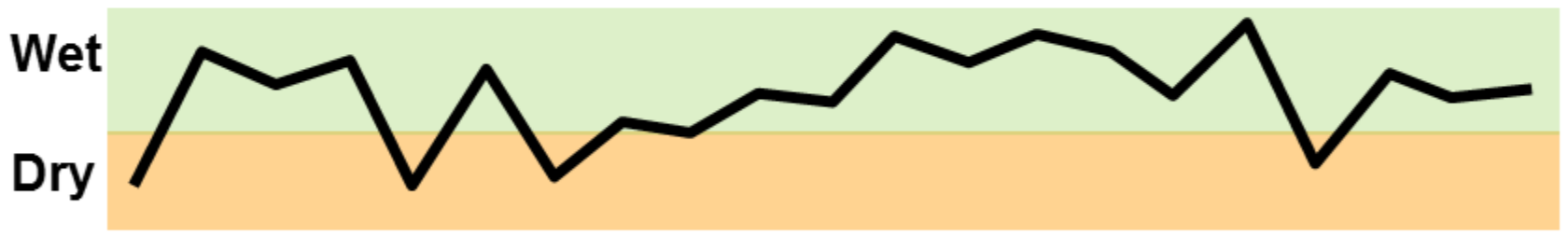
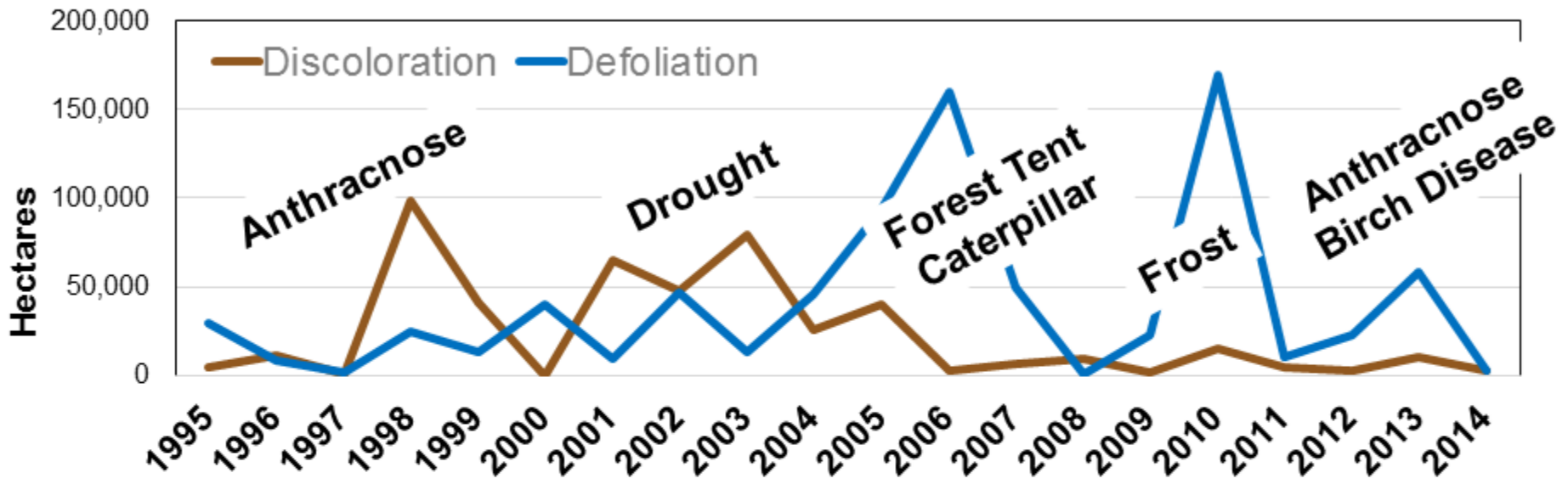
Total Foliage Damage Mapped by Year



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Patterns:

Damage is mapped every year.

A variety of damage agents are involved.

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Weather is a major driver.

The most critical symptoms are worse after dry years.

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Damage is mapped every year.

A variety of damage agents are involved.

Weather is a major driver.

The most critical symptoms are worse after dry years.

Results on the ground mirror results from the air.

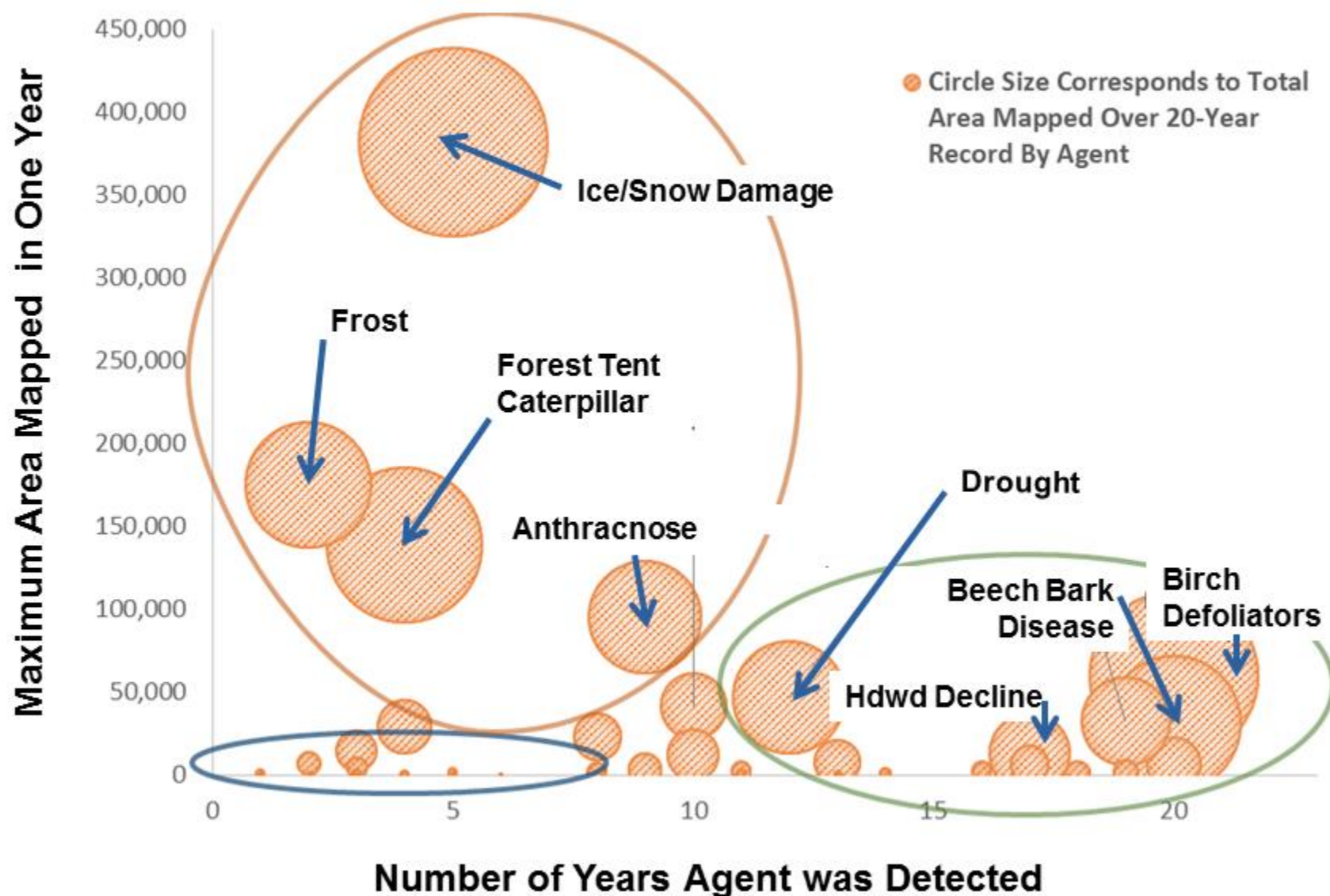
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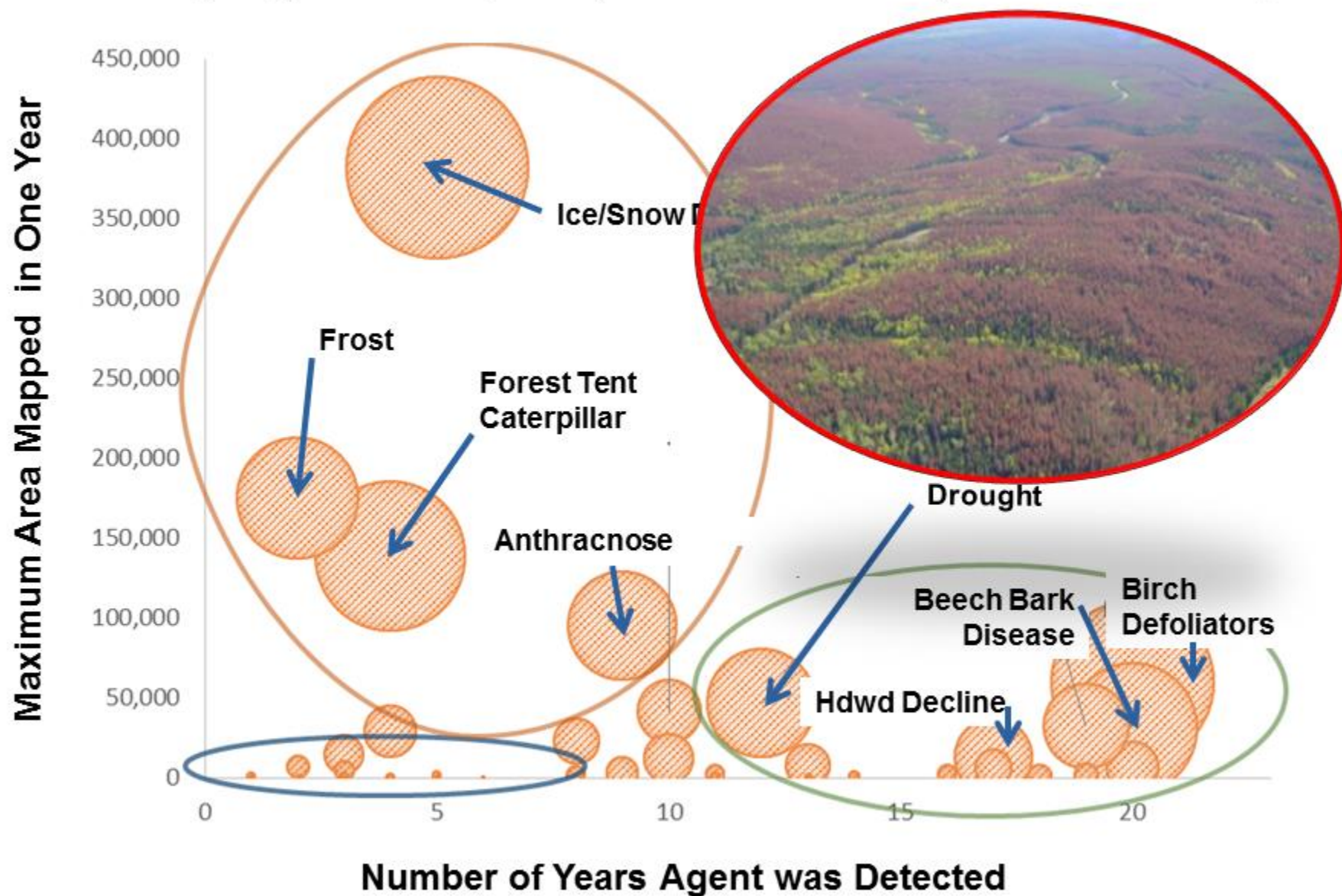
All Damage Agents: Frequency of Occurrence by Maximum Footprint

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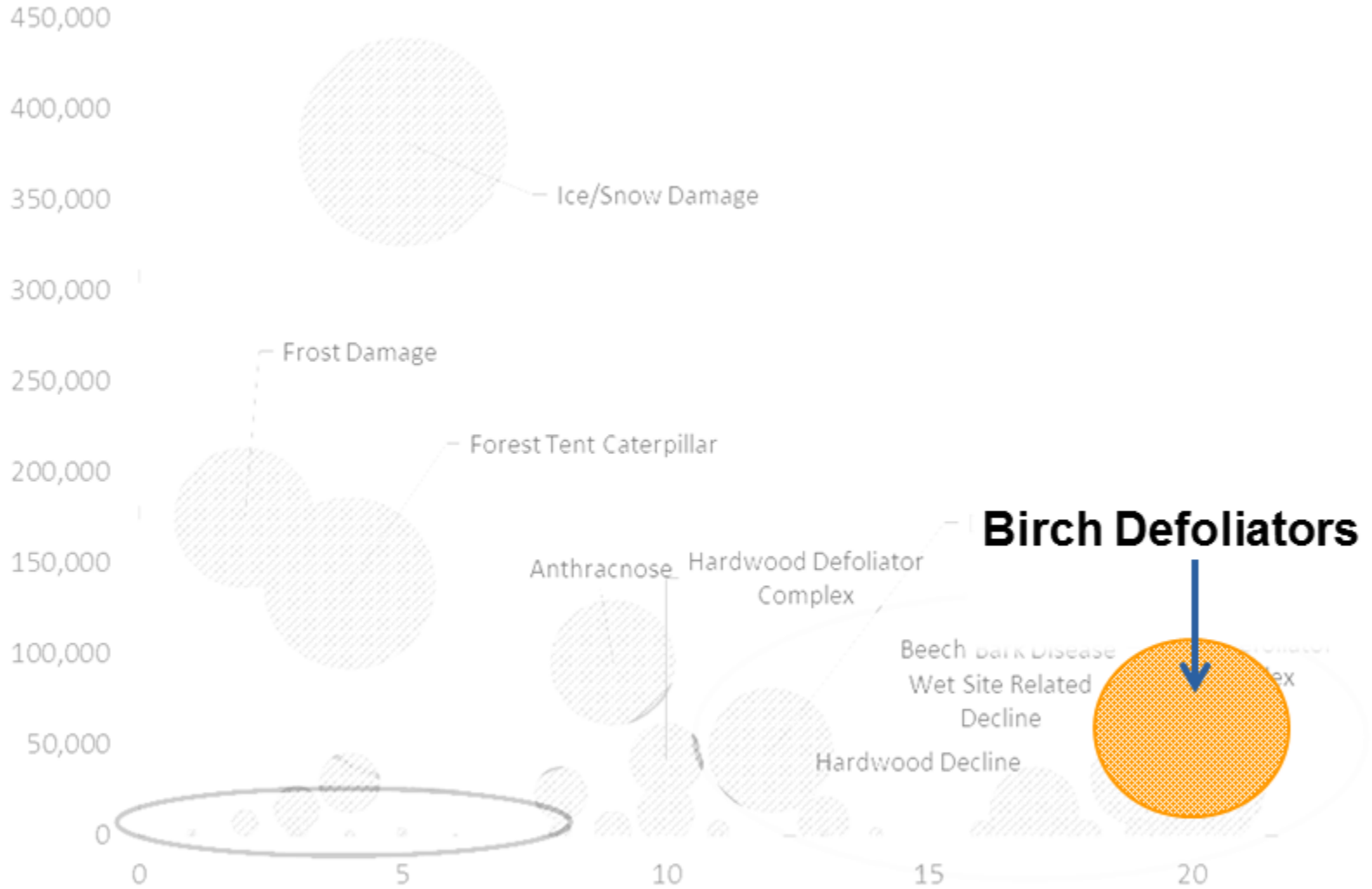


Vermont's Forestland = 1,860,000 Hectares

All Damage Agents: Frequency of Occurrence by Maximum Footprint



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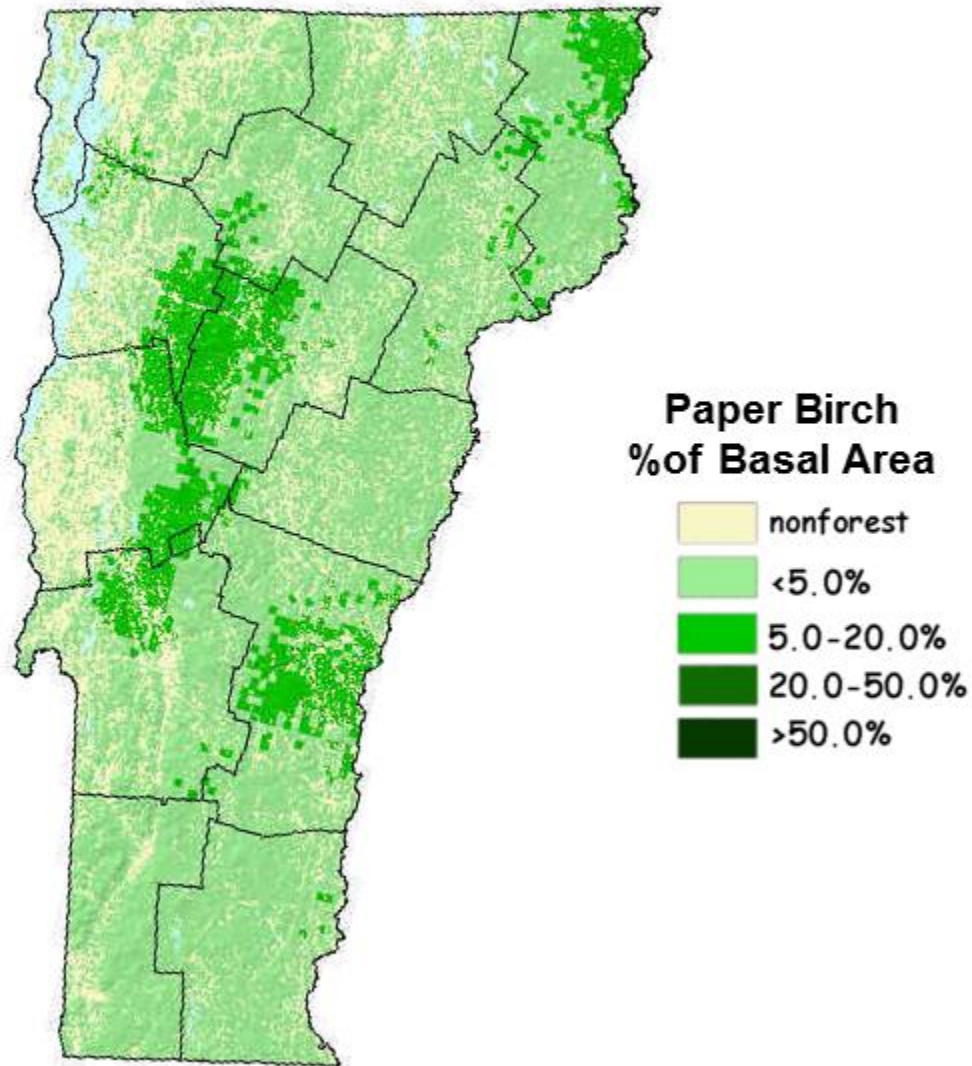


Birch Defoliators

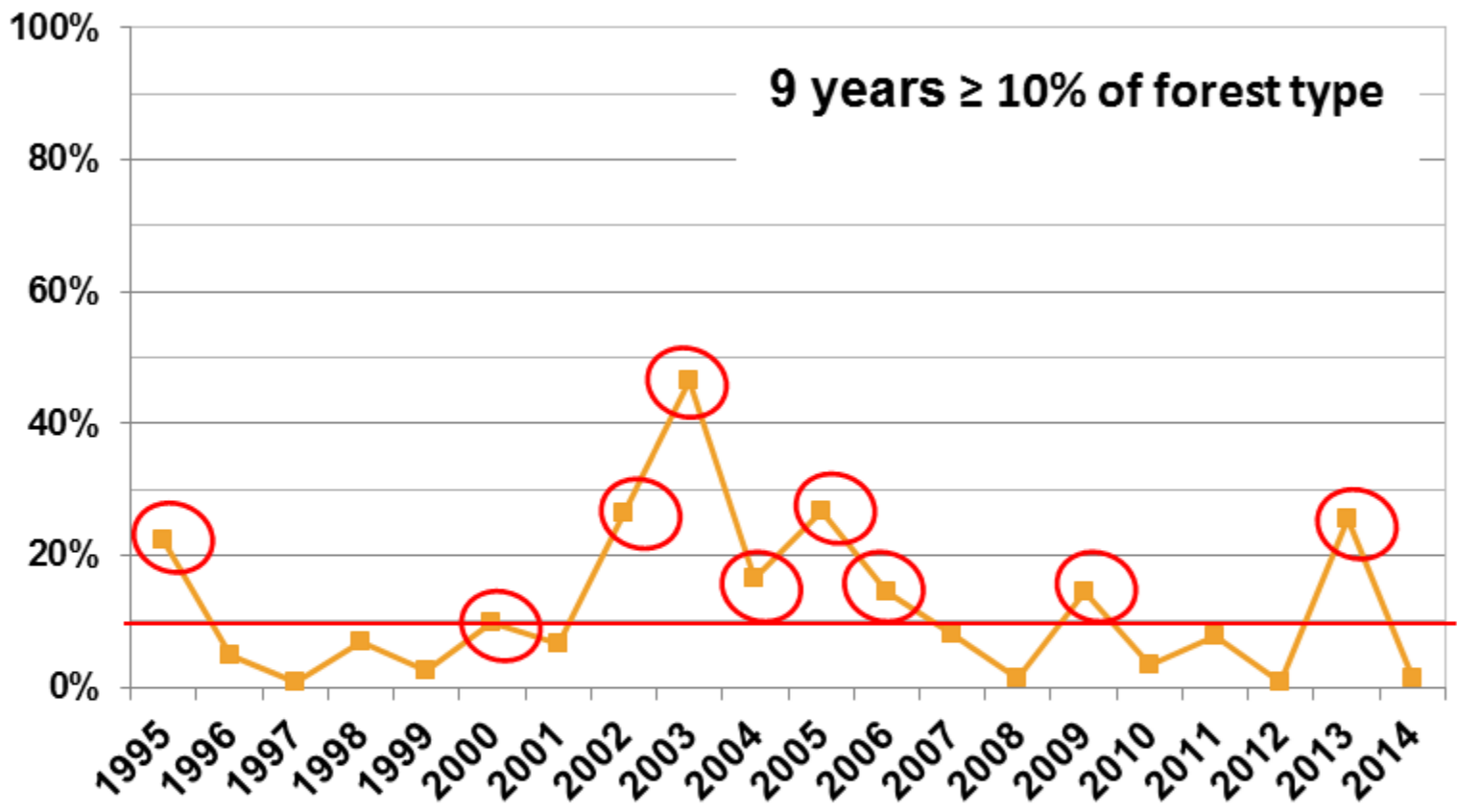


Forest Inventory & Analysis:

Birch/Aspen Forest Type = 7% of Vermont Forestland



Percent of Birch/Aspen Forest Type with Birch Defoliators



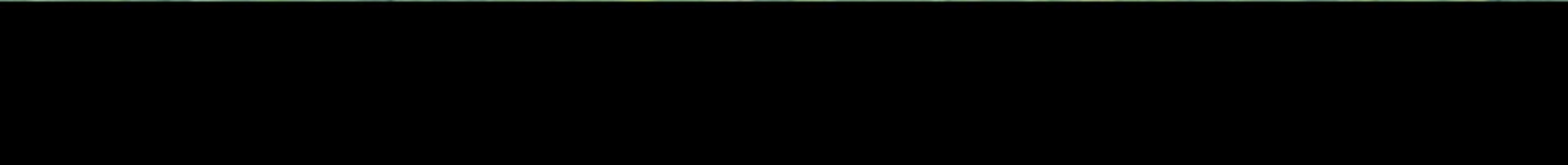


Beech Bark Disease

Decline

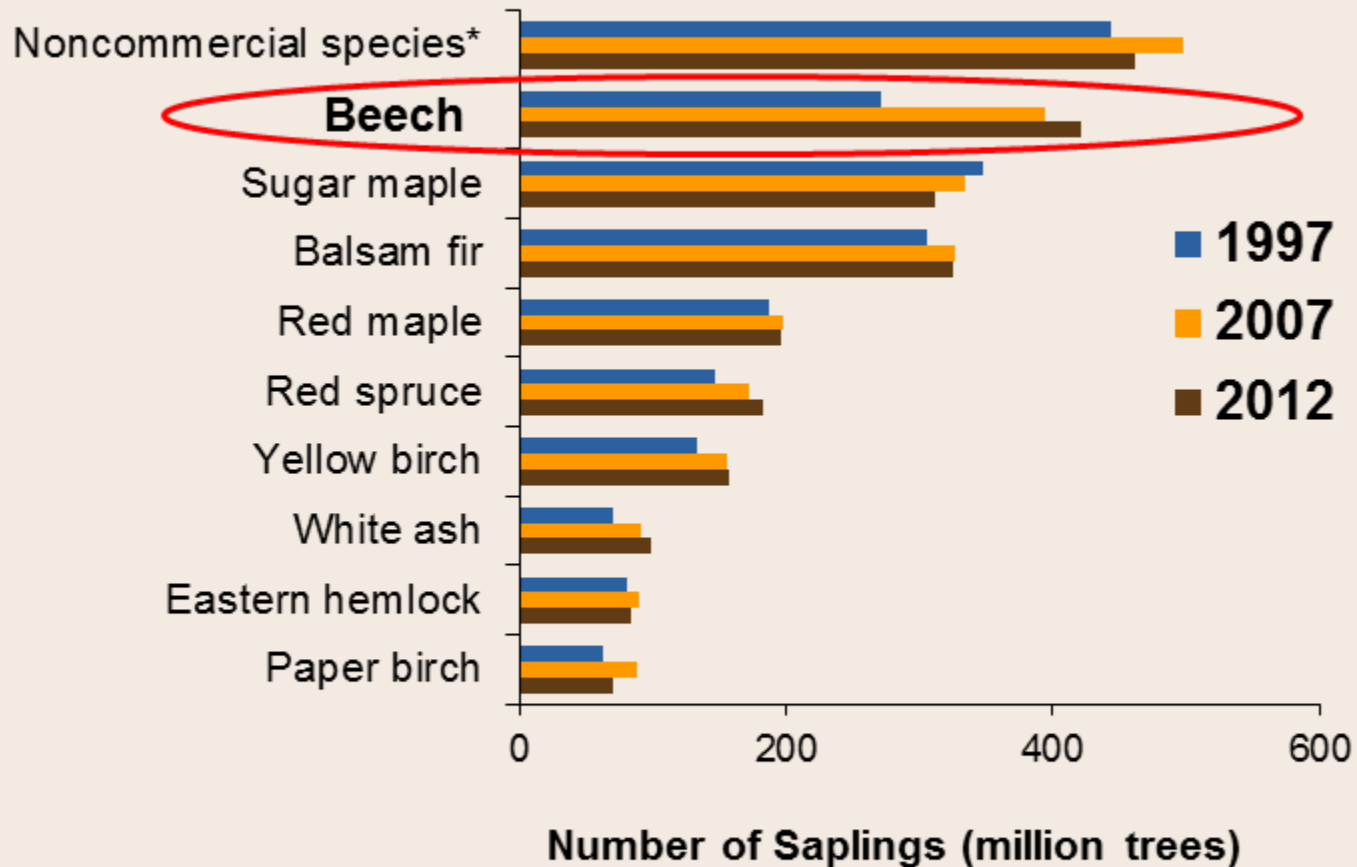
Birch Defoliator Complex





Forest Inventory & Analysis:

Number of Saplings on Timberland by Species in Vermont



Lessons Learned:

We're not seeing disturbances that affect a lot of Vermont's forestland every year...

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We're not seeing disturbances that affect a lot of Vermont's forestland every year...

...we are documenting significant impacts on some species.



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