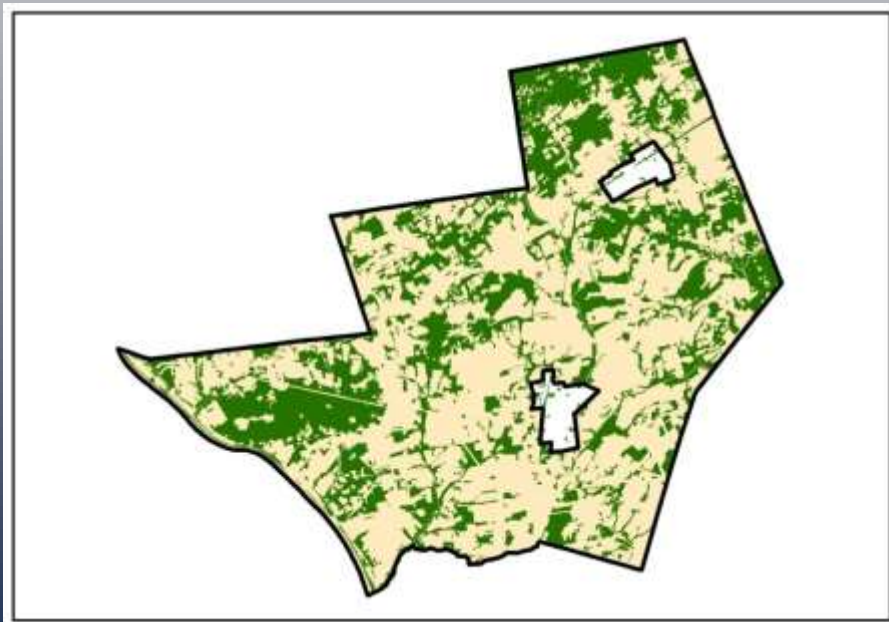
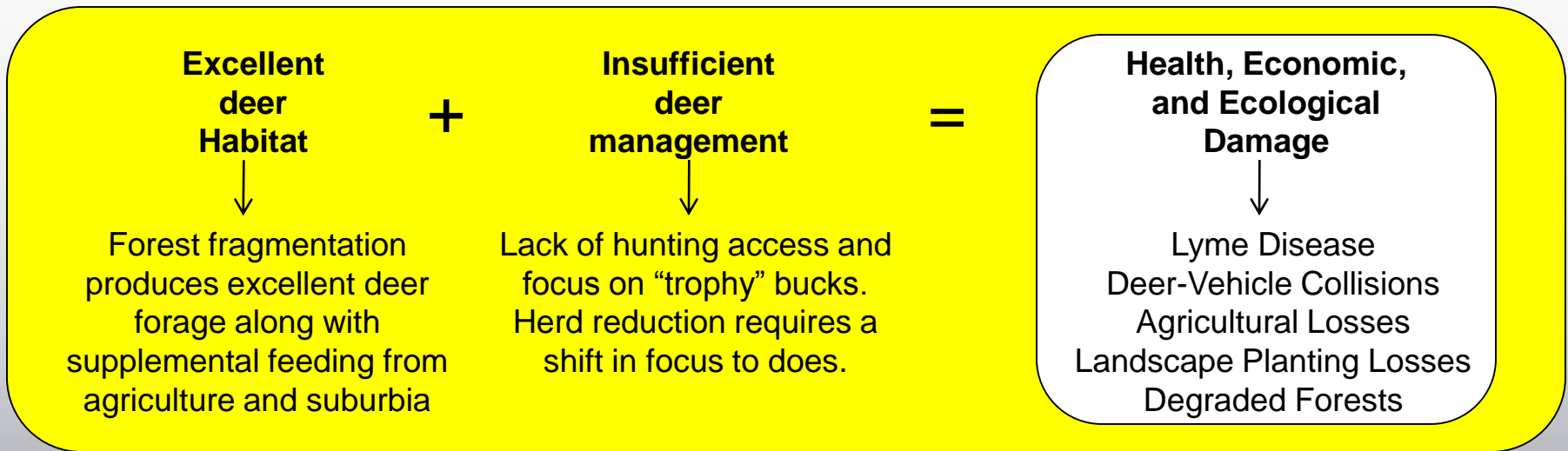


Engaging Partners for a Regional Approach: Hopewell Valley Deer Impacts and Management



Michael Van Clef, Ph.D., Stewardship Director
Member, Hopewell Township Deer Management Advisory Committee

The Root of the Problem: Deer Overabundance

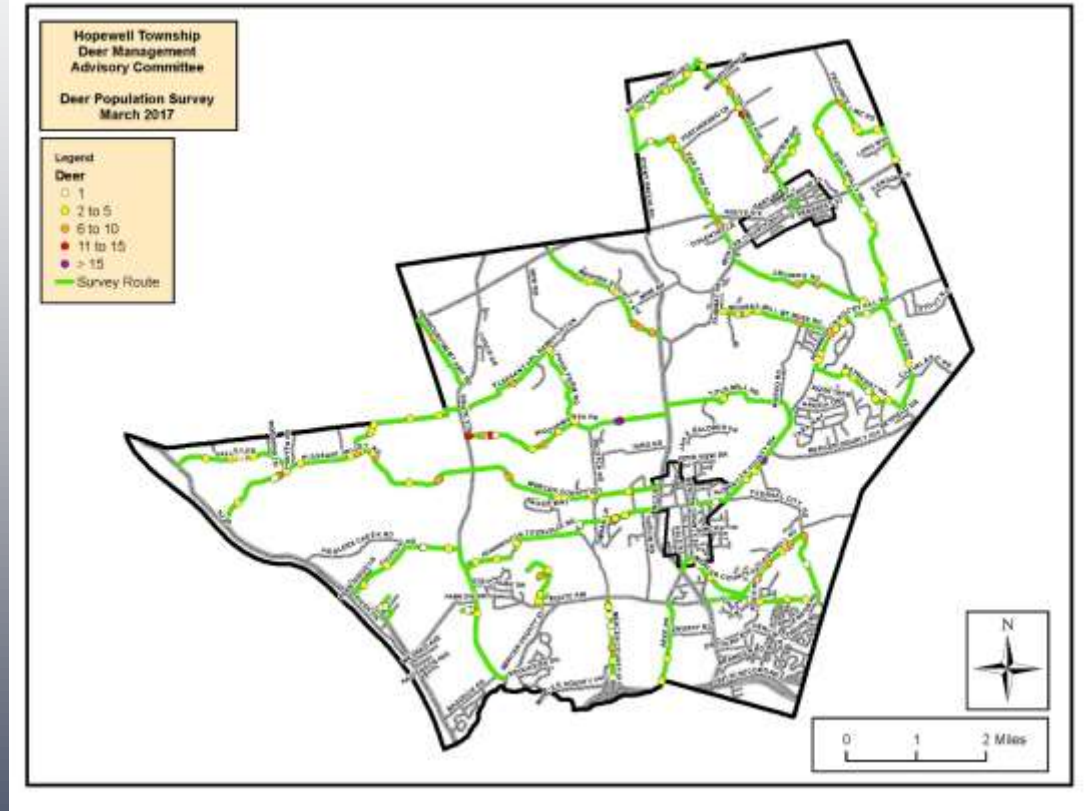


Forest Fragmentation in Hopewell Valley

While still containing over 15,000 acres of forest habitat (shown in green), forest edges, fields and suburban landscapes are numerous and serve as more productive deer habitat than forest interiors.

Deer Population Estimates

- Deer Counts in March 2017:
86 deer per square mile
Post-birthing estimate:
127 deer per square mile
- Published literature suggests that 10 deer per square mile is associated with low rates of Lyme disease, deer-vehicle collisions and healthy forests.
- Historic estimates also report 10 deer per square mile prior to European settlement of North America



How do you lose a forest? One gap at a time...

Large gaps in the forest canopy should result in lush growth of new trees and shrubs, but...



...excessive deer browse encourages growth of less palatable invasive species such as Wineberry and Japanese Stiltgrass.

There is always hope...



These very small seedlings of
tulip poplar and spice bush
**WILL REGENERATE THIS FOREST
IF THE DEER HERD IS BALANCED.**

What's
been done
and what
more can
we do?

HOPEWELL VALLEY DEER MANAGEMENT PLAN

Submitted to the Hopewell Township Committee

by the

Hopewell Valley Deer Management Task Force

PRIORITY READING



September 2010

Public Sentiment

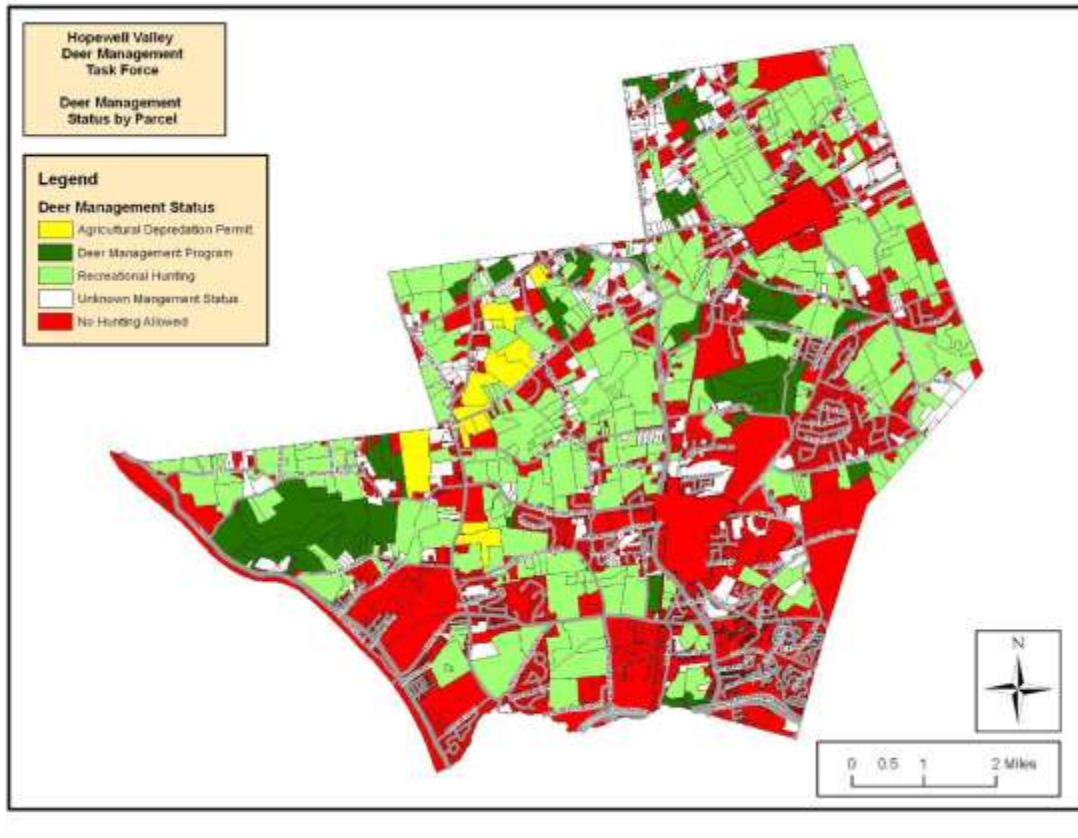
(surveys conducted in 2010 and 2016)

- Nearly 70% support deer herd reduction
 - About 15% are unsure
 - About 15% do not support deer herd reduction

Summary of Strategies

- **Strategy Set #1: Improvement of Hunting Access**
 - 1A) Encourage and facilitate hunting access on public and private lands
 - 1B) Develop strategies to access “pocket deer” in residential areas
- **Strategy Set #2: Improvement of Hunting Efficacy**
 - 2A) Encourage and facilitate coordinated hunting activities among neighboring landowners
 - 2B) Encourage and facilitate use of Agricultural Depredation Permits by farmers
 - 2C) Encourage and facilitate Deer Management Programs that focus harvests on female deer
 - 2D) Encourage and facilitate program for venison donation to local food banks
 - 2E) Consult with the NJ Division of Fish & Wildlife and other wildlife professionals to facilitate strategies 1A through 2D
- **Strategy Set #3: Avoidance of Deer Impacts**
 - 3A) Improve awareness of methods that reduce Deer Vehicle Collisions
 - 3B) Improve awareness of methods that reduce Lyme disease
 - 3C) Improve awareness of methods that reduce landscape damage
 - 3D) Discourage the intentional feeding of deer in non-hunting situations

Below: Information from 2010



Highlights since 2010

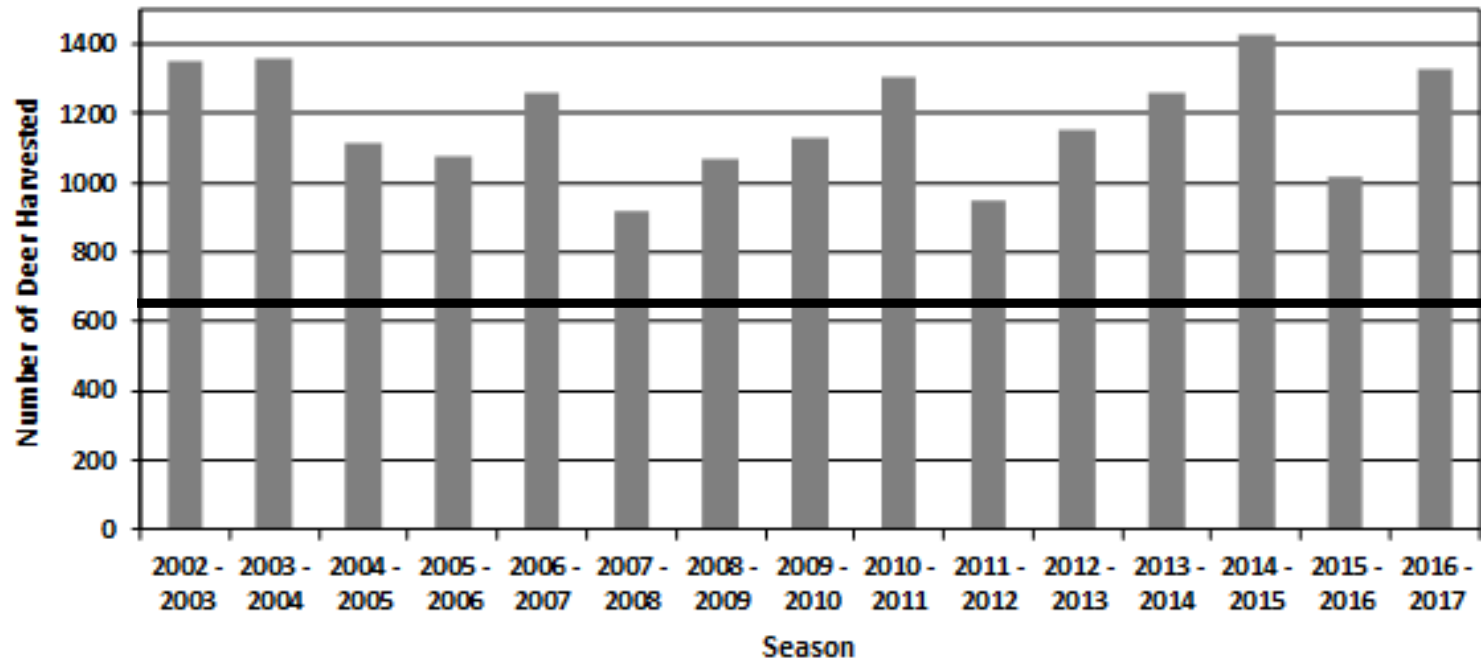
- Hopewell Township added 900 acres under DMP
- Mercer County added 850 acres under DMP
- FoHVOS encouraged private DMP's on 250 acres (including large and multiple small parcels)
- Additional use of agricultural depredation permits
- Other activities – outreach, public survey, DVC map, partnerships with other groups

Table 4. Summary of Parcel-level Deer Management Status in the Hopewell Valley

Hunting Status	Number of Parcels	Acres	% of Hopewell Valley*
Agricultural Depredation Permit	14	929	2
Deer Management Program	76	3346	9
Recreational Hunting	335	13578	36
No Hunting Access	6968	14944	43
Unknown Hunting Access	304	3729	10
Totals	7697	37601	100

* Hopewell and Pennington Boroughs were assumed to have no hunting activity, but their acreage totals were considered for calculations.

Hopewell Valley Deer Harvests



Prior to plan: Average harvest = 1,130

Since plan: Average harvest = 1,205 (7% increase)

Status of Goal Achievement

(75% improvement from 2010-2019)

- **Goal #1 - Reduce Lyme disease**

The current number of cases is 39 (stated goal is 16 by 2019).

Public Survey – 26% of households reporting infection

- **Goal #2 - Reduce Deer-Vehicle Collisions**

The current number of collisions is 449 (stated goal is 142 by 2019).

Public Survey – 49% of households reporting a collision

- **Goal #3 - Reduce Agricultural Losses**

The current percentage of farmers reporting > \$5,000 of annual damage was 14% (stated goal is 7% by 2019).

Highly underestimated? Fencing option is being utilized by some farmers.

- **Goal #4 - Reduce Landscape Planting Losses**

The current percentage of households reporting deer damage was 84% (stated goal is 21% by 2019).

- **Goal #5 - Reduce Ecological Damage**

The current percentage of native shrub and tree cover within the deer browse zone was 19% (stated goal is 37% by 2019).

Noticeable improvements are uncommon and spotty.

DMAC Goals - 2018

- Strategy Sets #1 and #2 (Improvement of Hunting Access and Efficacy)
 - Planning and continued implementation of the Township deer management program
 - Encouraging improved access and efficacy on both public and private lands
 - Development of cooperative and coordinated approaches for deer management with the Township Agricultural Advisory Committee and broader agricultural community as well as non-profit conservation groups and County land managers
 - **Increase use of Agricultural Depredation Permits**
 - Encouraging the establishment of a local butcher to become certified as an approved venison donation service with Hunters Helping the Hungry
 - Completed in early 2018
- Strategy Set #3 (Avoidance of Deer Impacts)
 - Provide outreach and warning signage to minimize deer vehicle collisions
 - Perform outreach on Lyme disease prevention and use of deer resistant landscaping

Potential Expanded Effort?

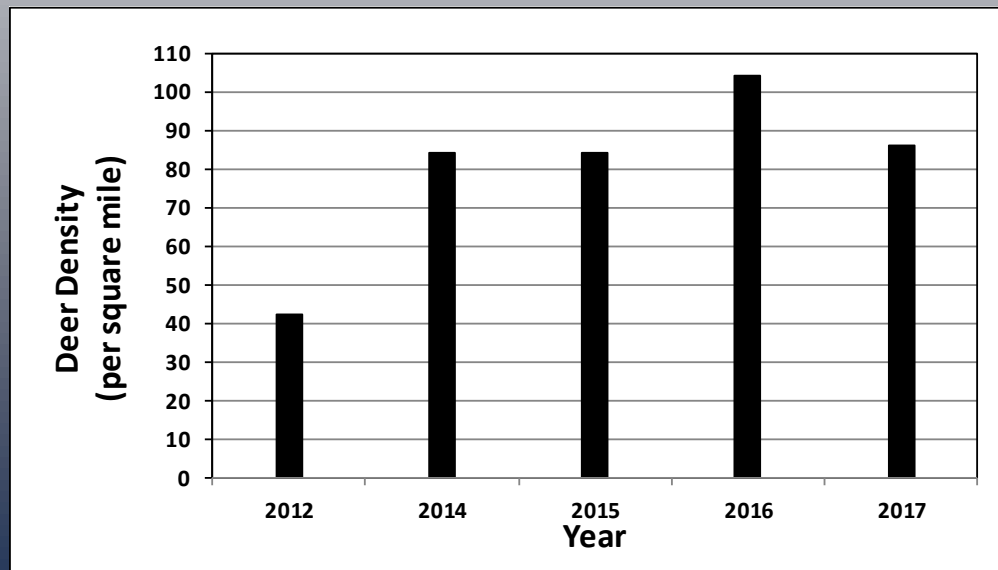
Community Based Deer Management Permit

- Utilized by counties and municipalities (e.g., Princeton, Millburn, Essex, Union)
- Requires in-depth Division of Fish & Wildlife application
 - DMAC has all justification data readily available
 - Specific implementation plan must be developed
 - Should include all Hopewell Valley municipalities
- Allows expanded deer management options
 - Use of paid professional and/or volunteer hunters
 - Professionals typically charge \$200-\$400 per deer (includes butchering)
 - Allows expansion of hunting season and hunting options (e.g., nighttime spotlight hunting, use of rifles)
 - Strongly suggests that venison be taken by hunters or donated to food banks
 - Typical butchering charge for donations is \$70 per deer

Population Reduction Goals

- Estimated herd size: 8,000
- If goal is 10 per square mile, then 7,200 would need to be harvested in a single year
- Average annual hunting harvest is 1,200 + annual car collisions of 500 = 1,700 deer 'harvested' annually...

...And this rate only maintains herd size...



Is herd reduction feasible?

- How is Hopewell different than other CBDM areas?
 - Large area (40,000 acres)
 - Mixture of agricultural and residential areas that feed and protect deer
 - Many, many parcels (>8,000 households)
 - No hunting access or lack of management hunting

An ambitious proposal

Double current annual harvest by taking an additional 1,700 deer to reduce population by 25% (65 per square mile)

- Significant Additional Effort - Community Based Deer Management Plan
 - Plan Implementation Costs
 - Cost Estimate: If only professional hunters = \$340K to \$680K (includes fees and venison donation)
 - Cost Estimate: If only volunteer hunters = \$120K (venison donation only).
 - Scope too large for volunteer hunters. Professional hunters can include currently unaffiliated but highly skilled hunters that may charge significantly less than existing professional organizations.
 - Plan Implementation that is financially feasible?
 - Requires significant planning and outreach to perform multiple, carefully coordinated deer drives
 - Recruit landowners and determine site-specific strategies
 - **Reduce costs** via government/non-profit staff performing planning and implementation?
 - **Reduce costs** via significant increase in Agricultural Depredation Permits?
 - **Reduce costs** via hunters taking some harvested deer?
 - **Reduce costs** via partnership with Hunters Helping the Hungry?
 - **Reduce costs** via local residents willing to take harvested deer (and pay for their own processing)?
 - **Reduce costs** by scaling back goals (e.g., focus on 1 or 2 smaller areas within Valley)?

Reclaiming the Success

The Deer Management Program at the Ted Stiles Preserve at Baldpate Mountain is bearing fruit. Native plants, freed from excessive deer browse, are outcompeting invasive plants.



Left: Photo of native spicebush thicket at the Ted Stiles Preserve at Baldpate Mountain.

Right: Close-up photo of thicket showing spicebush (larger leaves) overtopping the invasive Japanese barberry.

Invasive Plants: The Problem, Identification, and Control



The Goal

HEALTHY FORESTS!

Complete vertical structure
Advance regeneration
Species diversity

Diverse herb layer, tree and shrub seedlings, mature shrubs, tree saplings, sub-canopy trees, canopy trees





An invasive plant

- is introduced to an area outside of its natural range
- grows densely and excludes other species
- drastically reduces biodiversity at all levels
- interrupts the natural functions of an ecosystem

Garlic Mustard infestation

The invasive species problem

- Altering ecosystem function
- Reduce abundance of native species
- Rate of new introduction is still rising

New Jersey Numbers (plants only)

- 10,000+ non-native introductions?
- 1,000 established non-native plants
- 35 widespread invasive plants
- 100 emerging or potentially invasive plants



Susceptibility to Invasive Species

Suspected Relationship Between Native and Non-Native Plant Abundance in Relation to Land Use Intensity and Deer Abundance

Please note brief explanations provided below chart and species susceptibility table.

		Past Agricultural Use	
		Present	Absent
Deer Abundance	High	Invasive Plants: ↑↑↑	Invasive Plants*: 0 ---> ↑
		Native Plants: ↓↓↓	Native Plants: ↓↓↓
	Low	Invasive Plants: ↑↑	Invasive Plants: ↓↓↓
		Native Plants: ↑	Native Plants: ↑↑↑

*Invasive plants are slow to establish on unaltered forest soils even when deer abundance is high. However, infestations often occur quickly in forest gaps after canopy trees fall (presumably in response to increased light).

2017 Widespread Species

71 species

35 plants (Up from 34)

36 “animals” (Up from 35)

Animals include: 4 bird, 2 fish, 19 insects/invertebrates, 1 mammal, 9 pathogens, 1 reptile



Chinese Lespedeza: Stage 3 → Widespread

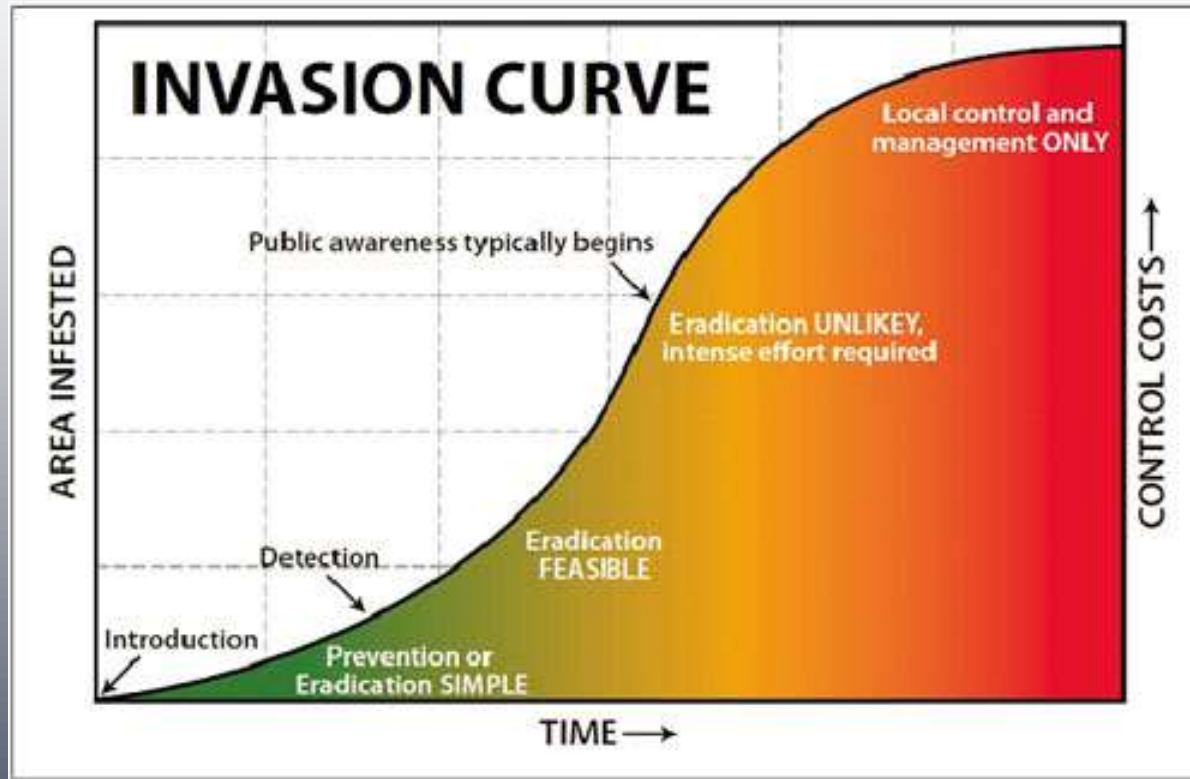
***Emerging* invasive species** are new to a specific area, and have demonstrated the **potential** to become widespread invasive species.



Japanese Aralia



Early Detection & Rapid Response



2017 Target Species

148 species

102 plants (Up from 100)

46 “animals” (Up from 43)

Animals include: 1 bird, 11 fish, 25 insects/invertebrates, 2 mammals, 6 pathogens, 1 reptile



Oak Wilt



Red-bellied Pacu



2017 Watch Species

45 species

41 plants (Up from 37)

4 “animals” (Up from 2)

Animals include: 2 insects/invertebrates, 2 pathogens



Lily Leaf Beetle

Work smart now? Or whine later??



An ounce of prevention...



...can avoid pounds of ecological damage!

Above: A single plant of Chinese silvergrass that was eradicated by the Strike Team. Below: An unchecked infestation located outside of New Jersey.

***STEWARDSHIP =
Mitigation of human
impacts
on natural systems***

Princeton Ridge East Conservation Area

Stewardship Plan

Species Map 16. Winged Burning Bush (*Euonymus alata*)







Map prepared by Michael Van Cleaf, Ph.D.
Ecological Solutions, LLC

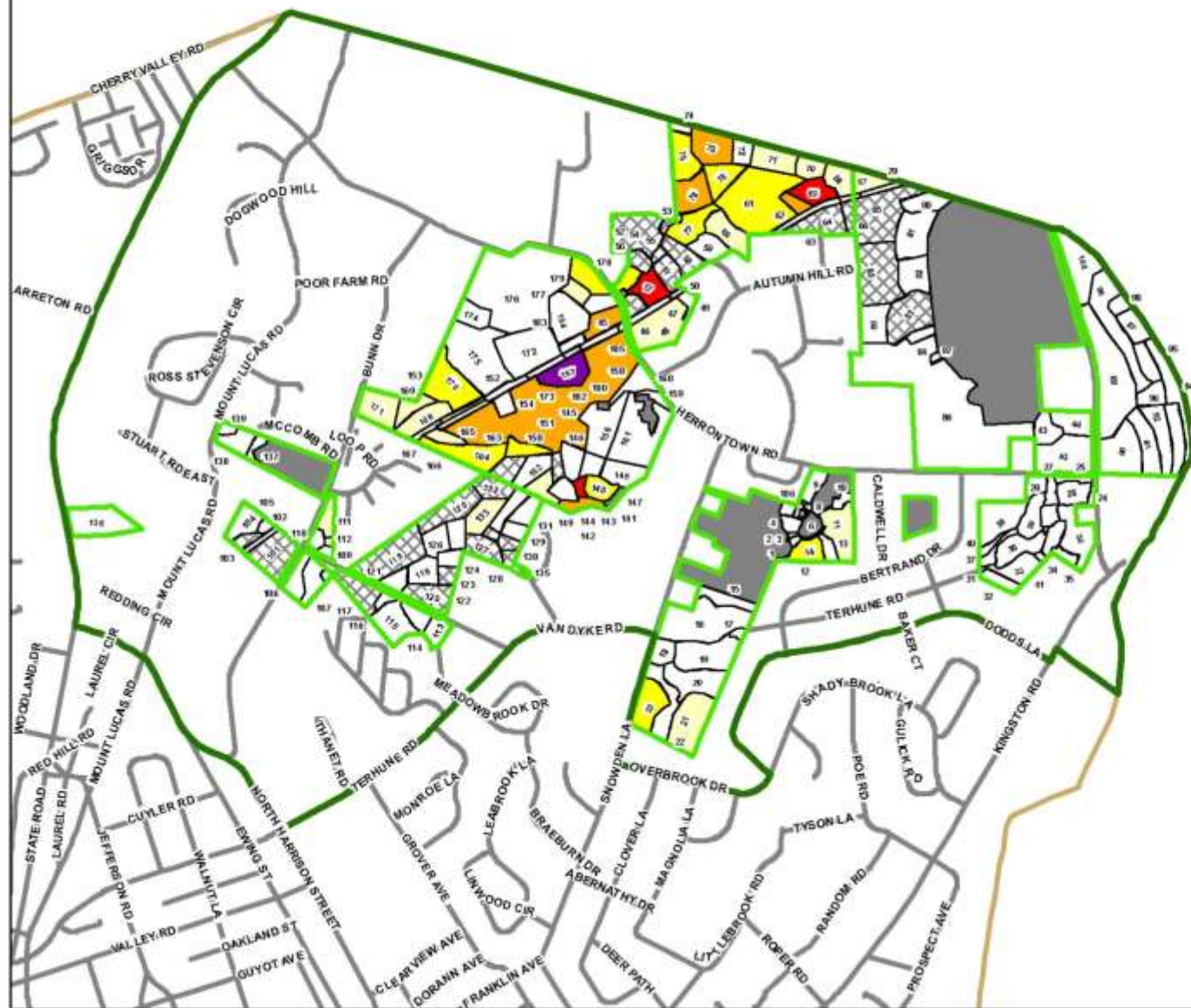
Legend

-  Conservation Area Boundary
-  Princeton Boundary
-  Partnership Properties
-  Non-Mapped Area
-  Mapping Area

Euonymus alata

Cover Class

-  Trace (< 1%)
-  1 (1 - 10%)
-  2 (11 - 25%)
-  3 (26 - 50%)
-  4 (51 - 75%)
-  5 (> 75%)



0 0.25 0.5 Miles

Princeton Ridge East Conservation Area

Stewardship Plan

Species Map 6. Japanese Aralia (*Aralia elata*)








Map prepared by Michael Van Cief, Ph.D.
Ecological Solutions, LLC

Legend

-  Conservation Area Boundary
-  Princeton Boundary
-  Partnership Properties
-  Non-Mapped Area
-  Mapping Area

Aralia elata

Cover Class

-  Trace (< 1%)
-  1 (1 - 10%)
-  2 (11 - 25%)
-  3 (26 - 50%)
-  4 (51 - 75%)
-  5 (> 75%)
-  *Aralia elata* point



0 0.25 0.5 Miles

Detected Populations – All Years

Potential Target Species	Autumn Hill	Fieldwood	Greenway Meadows	Herrontown	Mountain Lakes	Smoyer	Woodfield	TOTAL
Amur corktree	0	0	0	0	0	0	0	0
Boston ivy	0	0	0	1	0	0	0	1
Callery pear	0	1	0	0	12	1	0	14
Chinese silvergrass	0	0	0	0	0	1	0	1
English ivy	0	0	19	4	39	6	3	71
Indigobush	0	0	0	0	2	0	0	2
Japanese angelica tree	0	0	3	27	4	0	0	34
Japanese maple	0	0	6	18	0	0	0	24
Japanese wisteria	0	0	0	1	0	1	0	2
Japanese zelkova	0	0	0	0	0	1	0	1
Jetbead	0	0	0	4	3	0	2	9
Kousa dogwood	0	0	1	0	3	0	0	4
Linden viburnum	28	0	27	62	65	7	39	228
Oriental photinia	10	2	37	45	164	2	48	308
Porcelainberry	0	0	12	0	0	2	0	14
Sericea lespedeza	4	0	1	3	0	0	1	9
Siebold's arrowwood	0	2	2	2	5	0	1	12
Sweet autumn virginsbower	0	0	0	2	0	0	0	2
Toringo crab	0	0	0	2	0	2	1	5
Winter creeper	0	2	10	2	5	3	0	22
Yellow iris	0	0	0	0	1	0	1	2
Totals								765

Goals by species and site

Site	Amur corktree	Boston ivy	Callery pear	Chinese silvergrass	English ivy	Indigobush	Japanese angelica tree	Japanese maple	Japanese wisteria	Japanese Zelkova	Jetbead	Kousa dogwood	Linden viburnum	Oriental photinia	Porcelainberry	Sericea lespedeza	Siebold's arrowwood	Sweet autumn virginibower	Toringo crab	Winter creeper	Yellow iris
Autumn Hill													3	3							
Fieldwood			1														1			1	
Greenway Meadows					2		1	1				1			4	1	1			1	
Herrontown Woods		1			1		1	1	4		1		3	3			1	1	1	1	
Mountain Lakes Area			1		2	1	1				1	1					1			1	
Smoyer Park			1	1	2				4	1					4				1	1	
Woodfield Reservation					1								3	3			1		1		
TOTAL																					

Strategy Codes:

1) Eradicate, 2) Multi-year Eradication Effort, 3) Multi-year Control Effort, 4) Contracted Eradication Required

Strike Team Phone App



NJ Invasive Species
Strike Team

5452640

NJ Invasive Species Strike Team



Species Categories
Report and View Species by Category >



All Species
Report and View All Species >



My Species List
Short List of Your Selected Species >



Upload Queue
View, Edit or Upload Your Reports >



EDDMapS Login
Login or Register with EDDMapS >



Manage Sites
Refresh from Server or Delete Locally >



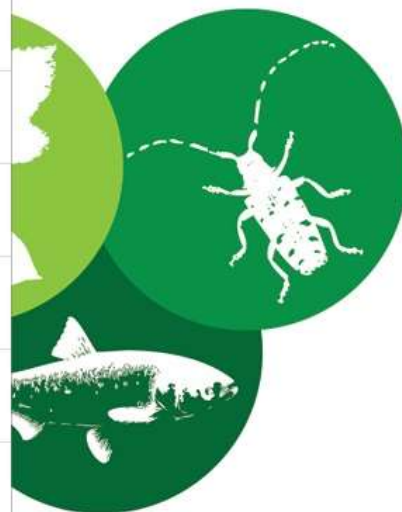
News Feed
Recent Invasive Species News Articles >



About
The App, EDDMapS and Strike Team >



Feedback
Email Us Comments on the App >

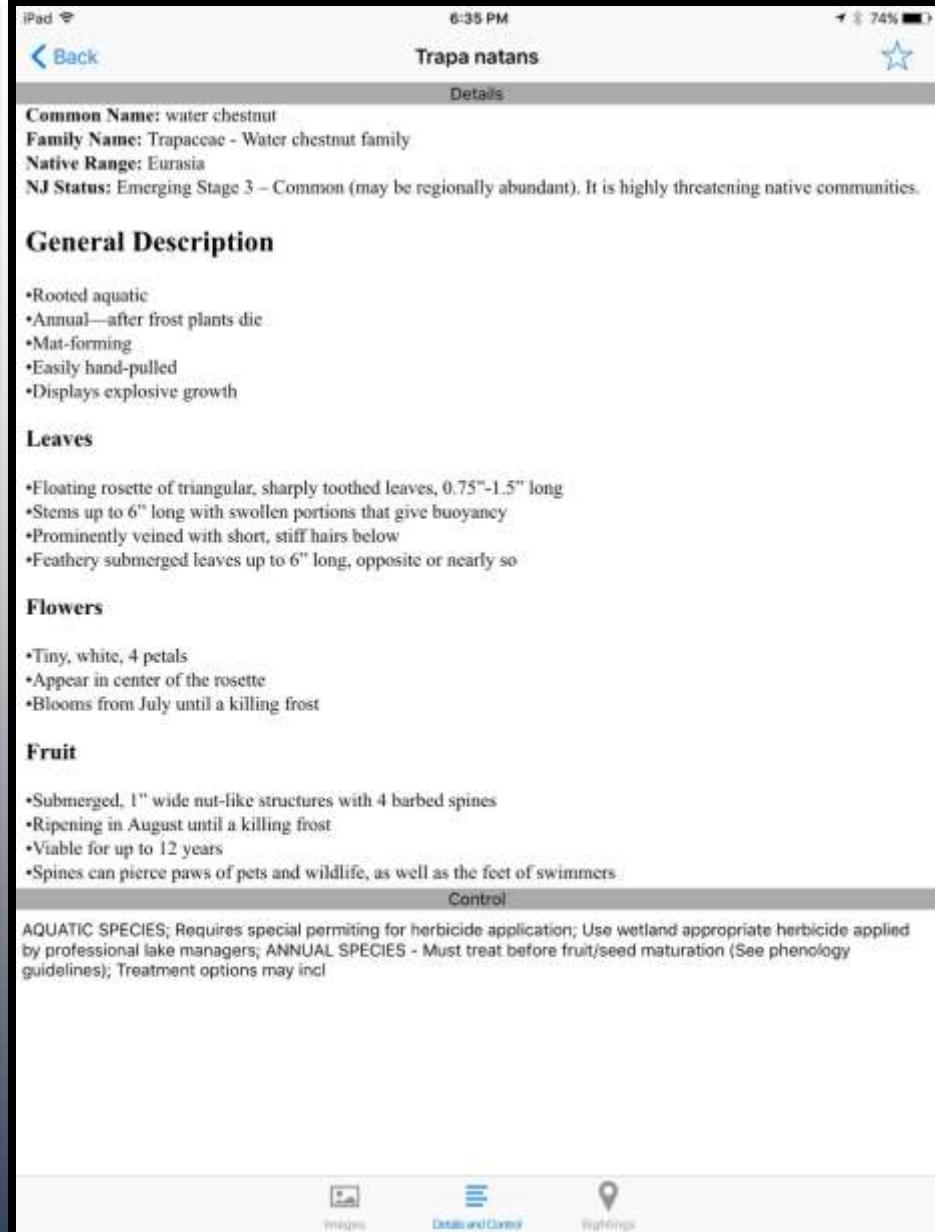


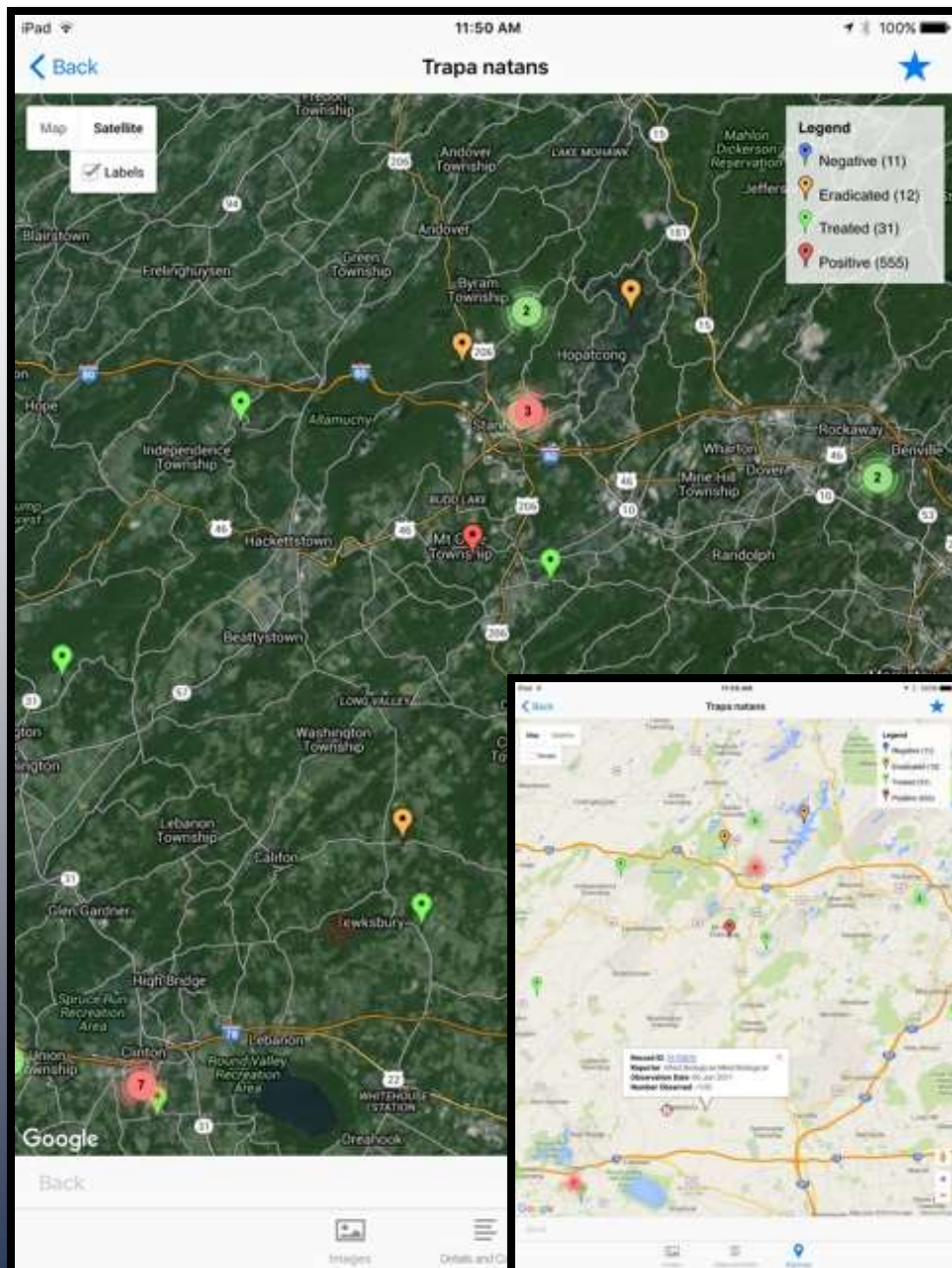
asive Species
ke Team



Search by Scientific or
Common Name
OR
Just Scroll Through the
Images









- Check current NJ status
- Check the map to make sure it is not already reported
- Camera - take picture(s)
- Site name
- Required: property type, population size, habitat
- Strike Team will verify

iPad 6:37 PM 73%


[Back](#)

Trapa natans
European water chestnut
Stage 3


2016-03-02 18:36 PM

Private Land 001

Report Images

 Tap Here to Add Photo

Location

Latitude: 40.68287
Longitude: -74.80066
Accuracy: 10.0 m 

Observed Species Information

Property Type (required)

Habitat (required)

Population Size (required)

Notes

Additional information goes here. Do not include personal information. All information entered in this field will be displayed publicly.

[Save](#)

Identification

Oriental photinia (*Photinia villosa*)



**Emerging, but
Widespread in Princeton**



- Shade-tolerant
- Leaves sessile, lacking stem
- Autumn foliage reddish-orange
- Fruit is bright red

Native: Chokeberry, *Photinia* spp. (*native shrub*)



- Meadow and edge habitats
- Leaves have 0.25" stem
- Deep red or dark-purple fruits

Linden viburnum (*Viburnum dilatatum*)



Widespread



Fall/ Winter fruit



Summer
fruit



- Leaves and young stems are fuzzy
- Leaves are variable-- usually less coarsely toothed than Arrowwood
- Fruit is *bright red*- persist into December

Native: Arrowwood (*Viburnum dentatum*)



- Leaves more deeply toothed & rounder
- Round, dark purple fruits
- Leaves/stems on mature shrubs are not hairy

Japanese aralia (*Aralia elata*)

Emerging



- Inflorescence 12"-24" long, lacking a central axis
- Often wider than long, with leaf base surrounded or overtopped by foliage
- Main leaf veins extend to leaf margin

Look-alikes:
Devil's Walking
Stick,
(*Aralia
spinosa*)—small
native tree



- Inflorescence longer, 3'-3.5' with a distinct central stalk
- Main leaf veins branch & diminish at leaf margin
- Typically southern, extends into PA, DE

Siebold's Viburnum (*Viburnum seiboldii*)

Emerging



- thick, dark, leathery leaves
- leaves & twigs have a strong rubber scent
- large terminal bud
- hairy veins
- large, flat topped flower clusters- mature from red to black



Common buckthorn (*Rhamnus cathartica*)



3-4
strongly
upcurved
veins

- Tree to 20' tall
- Leaves nearly opposite, toothed
- Twigs often spine tipped
- Small, yellow flower clusters of 10-15 flowers
- Fruits 4-seeded



Look-alike: Blackhaw (*Viburnum prunifolium*)—Native shrub

- 16' tall
- Leaves opposite, finely toothed
- Upcurved veins
- Black fruits in clusters
- Showy white flowers
- Reddish tinge to petiole & leaf edge



Japanese maple (*Acer palmatum*)

Emerging



- Opposite leaves with 5-9 lobes
- drooping flower clusters May-June
- Reddish wings seeds (samaras)



Hundreds of cultivars,
including some cutleaf
varieties

Callery (bradford) pear (*Pyrus calleryana*)

Emerging



Red fall color



Early spring flowers



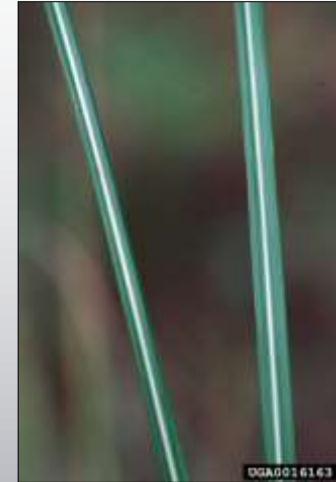
- pyramidal growth pattern
- oval, glossy leaves
- small, round, gold-speckled fruit

Chinese silver grass (*Miscanthus sinensis*)

Emerging



- Showy, silvery flowers in August
- White midrib
- Many cultivars



“Zebrinus”
cultivar



Q & A

Michael Van Clef, mvanclef@fohvos.org; 908-528-6674

Plants and Birds of Healthy Forests



Clockwise from top left: mountain laurel,
witch-hazel, maple-leaved viburnum



Clockwise from top left: blackburnian
warbler, black-throated blue warbler,
chestnut-sided warbler, ovenbird