



2024 SUSTAINABILITY  
SUMMIT



# LAND MANAGEMENT TRIAGE

May 3, 2024

Session 1; GS1

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### WIFI INFORMATION: 2 Open Networks

1. **sustainablenj**: Ballroom, GS3, Nonprofit Exhibit area
2. **Bell\_Works\_Conf\_Center**: Bell Theatre & Conference

**SUSTAINABILITY**  
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# Land Management Triage

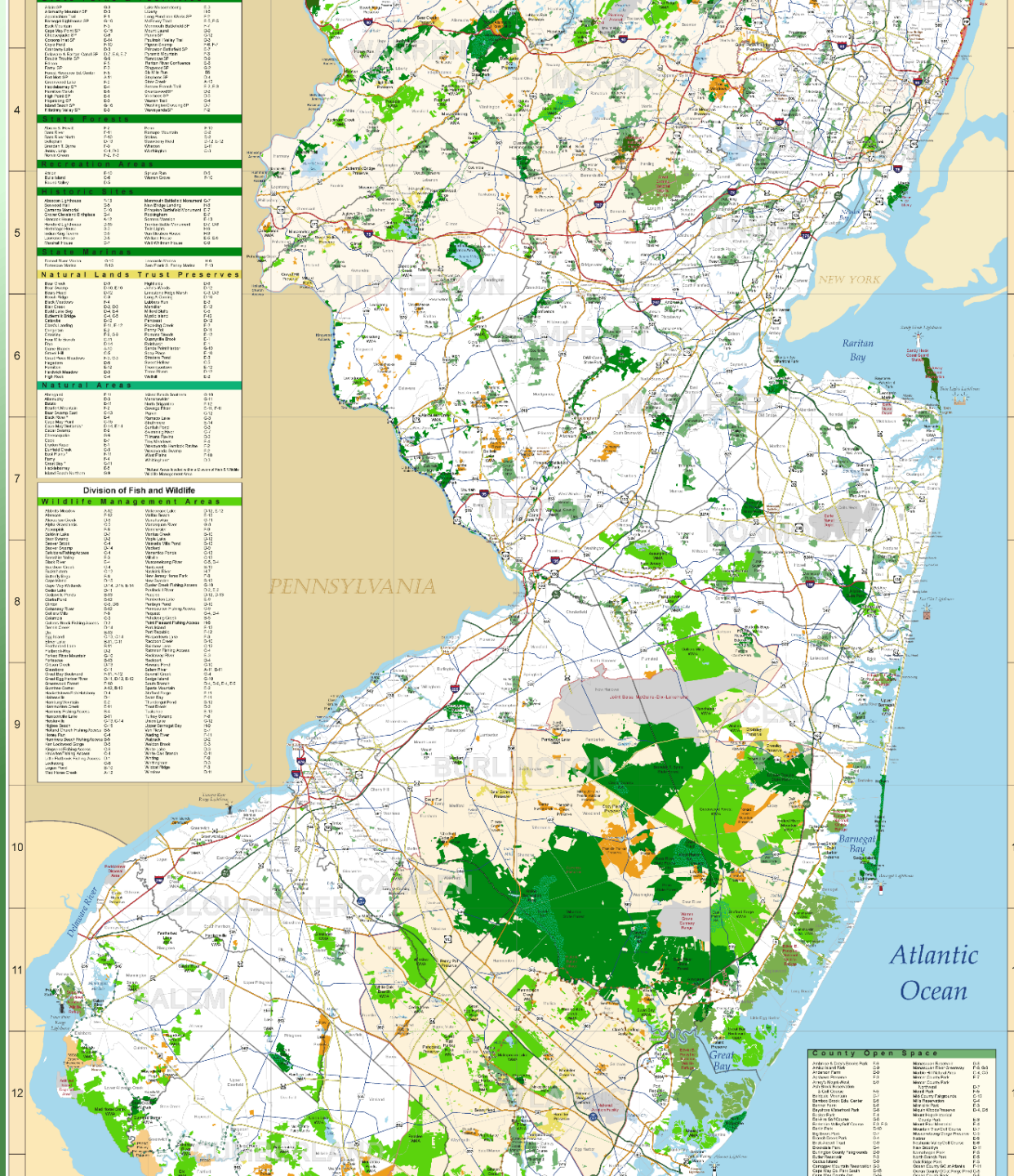
2024 Sustainability Summit

Session #1 – GS1

# SUSTAINABILITY SUMMIT



# Land Management Triage



# Speakers and Agenda

## Land Management Triage

- Overview
- Framework for Decision-making
- Case Study: Eatontown
- Retrofit Stormwater Basins
- Questions & Answers



**Michael Van Clef**



**Laura Bagwell**



**Clay Emerson**



# SUSTAINABILITY SUMMIT



# Framework for decision- making

Michael Van Clef, Program Director  
New Jersey Invasive Species Strike Team



## Active & Recent Projects

See what we're doing in the  
field with the help of our  
partners.

PAST STRIKE  
TEAM PROJECTS



Essex County Parks –  
Protecting Urban  
Forests



Morristown National  
Historic Park –  
Strategic Invasive Plant  
Control

# Land Management Triage Framework for Decision Making



FoHVOS New Jersey  
Invasive Species  
**Strike Team**

Presented by Michael Van Clef, Ph.D.,  
Strike Team Program Director



FoHVOS New Jersey  
Invasive Species  
**Strike Team**

## Our Mission

We work to protect natural lands, with their full abundance and diversity of native plants and animals, from future damage through coordinated strategic invasive species management. Active mapping, data analysis, engaging in community outreach and training, and practicing early detection and rapid response (ED/RR) to new threats; we are the only entity solely dedicated to protecting rare species and special places from invasive species throughout New Jersey.

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

# Why do we care?



## SO MANY GOOD THINGS





# The Goal

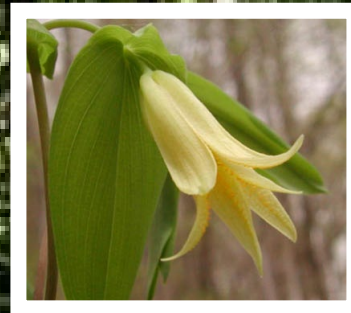
HEALTHY FORESTS!

Complete vertical structure

Advance regeneration

Species diversity

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

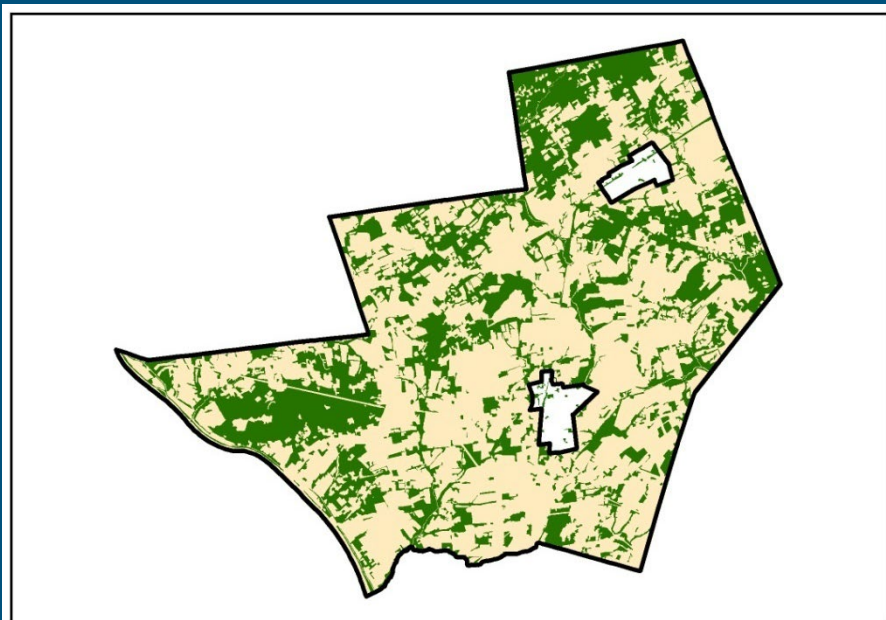
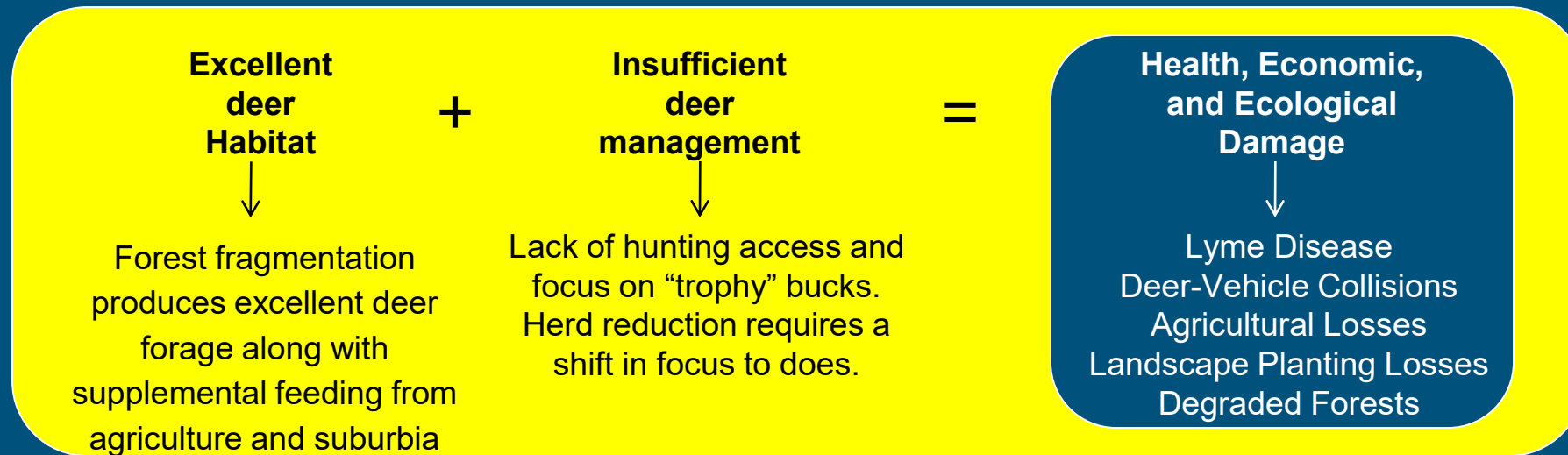


# The Mess We've Made...

- Habitat Destruction
- Overabundant Deer
- Invasive Species
- Agricultural Soil Modifications

- Altered Fire Regimes
- Altered Stream Flows
- Habitat Fragmentation
- Global Climate Change

# 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.



The Good...



The Bad...



and The Ugly!

"I now suspect that just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deer. And perhaps with better cause, for while a buck pulled down by wolves can be replaced in two or three years, a range pulled down by too many deer may fail of replacement in as many decades."

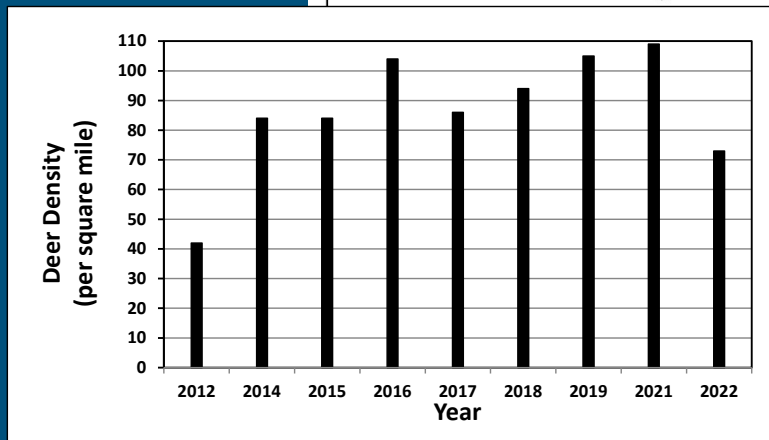
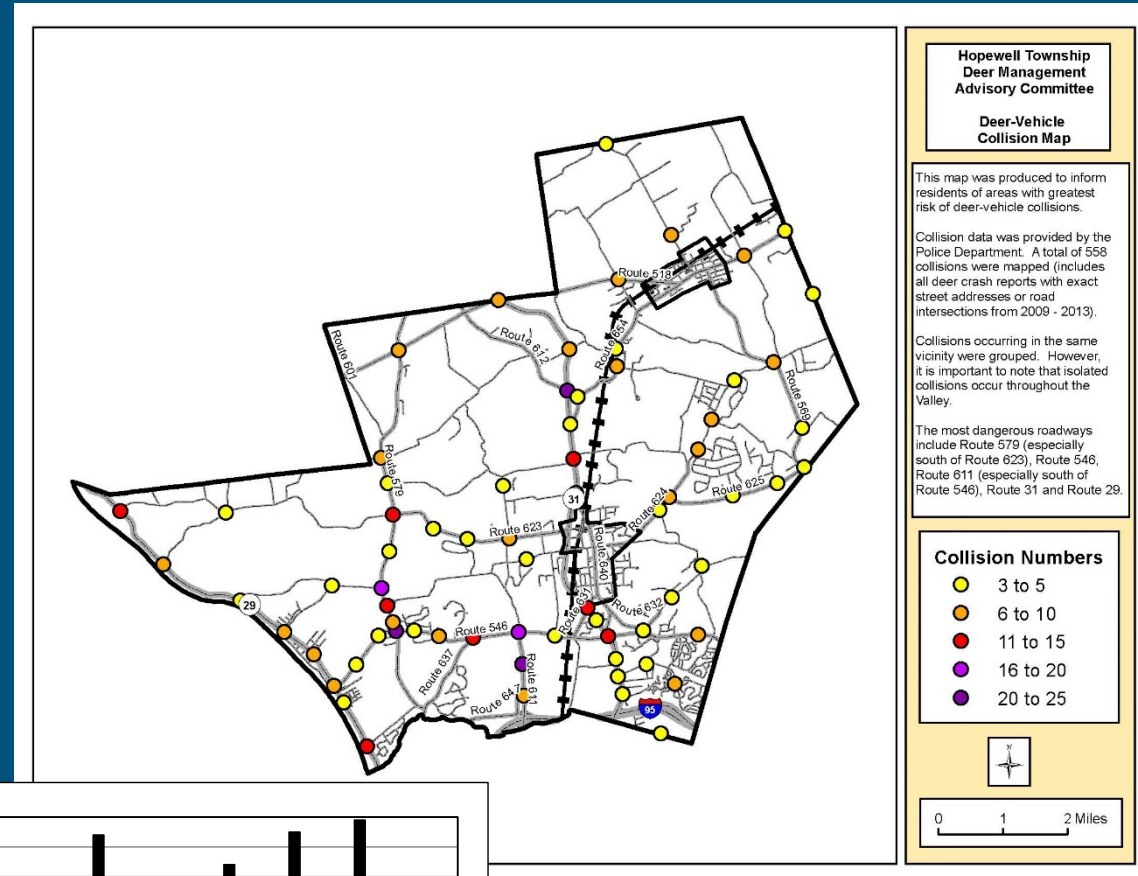
-Aldo Leopold

### Damage to Forest Health

- Loss of native shrubs & herbs
- Loss of tree seedlings to replace fallen canopy trees
  - Loss of native fauna dependent upon native flora
- Increase number of invasive plants that are unpalatable to deer

# Deer Population Estimate Results

- 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

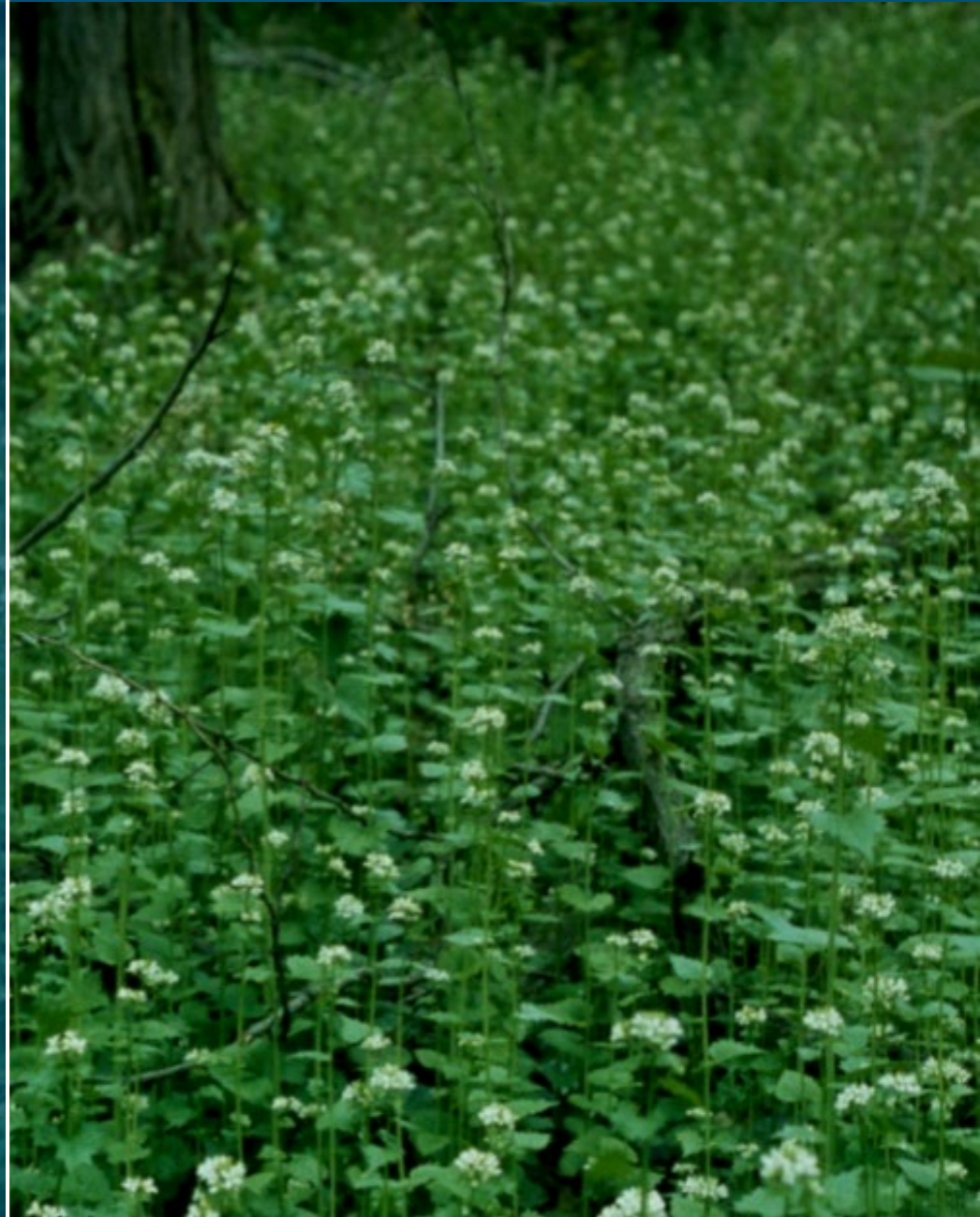


[Download Link:](#)  
[Deer Management Slides](#)

# An Invasive Plant...

1. Introduced to an area outside of its natural range
2. Grows densely and excludes other species
3. Drastically reduces biodiversity at all levels
4. Interrupts the natural functions of an ecosystem

Pictured: Garlic Mustard Infestation



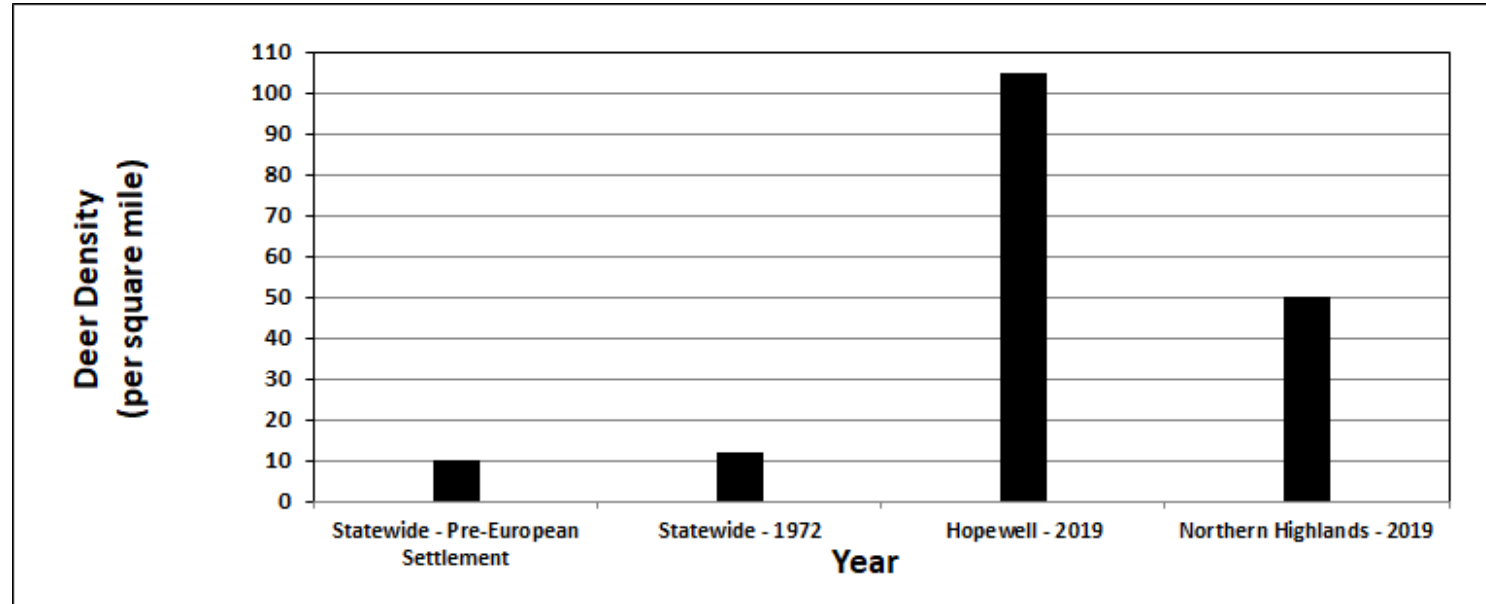
# Why are invasives bad? A broken web...

Species	January	February	March	April	May	June	July	August	September	October	November	December
Autumn Olive					Flowers				Fruit	Fruit		
Gray Dogwood					Flowers	Flowers			Fruit			
Arrowwood						Flowers			Fruit			
Red Chokeberry					Flowers				Fruit	Fruit		
American Hazelnut				Flowers						Fruit		
Blackhaw Viburnum					Flowers			Fruit	Fruit			
Bayberry					Flowers				Fruit	Fruit	Fruit	
Virginia Rose	Fruit	Fruit	Fruit			Flowers	Flowers			Fruit	Fruit	Fruit
Winterberry	Fruit	Fruit	Fruit		Flowers					Fruit	Fruit	Fruit
Wild Black Cherry					Flowers		Fruit					
Flowering Dogwood				Flowers	Flowers				Fruit	Fruit		
Foxglove Beardtongue	Seeds	Seeds	Seeds			Flowers				Seeds	Seeds	Seeds
Black-eyed Susan	Seeds	Seeds	Seeds			Flowers	Flowers	Flowers	Flowers	Seeds	Seeds	Seeds
Goldenrods	Seeds	Seeds	Seeds						Flowers	Flowers	Seeds	Seeds
Asters	Seeds	Seeds	Seeds						Flowers	Flowers	Seeds	Seeds
Common Milkweed							Flowers	Flowers	Seeds	Seeds	Seeds	Seeds

Invasive plants  $\neq$  insect food  $\neq$  bird food



# The timing isn't a coincidence...



- Invasive Plant History

- Prior to 1950's: Few species, Japanese Honeysuckle only notable invader. Others included Tree-of-Heaven and Multiflora Rose
- Beginning in 1980's: Growing populations, expansive Japanese Stiltgrass and Japanese Barberry infestations
- Currently: Many widespread species and growing list of emerging species





# Attributes of Invasive Plants



- *DEER DON'T EAT THEM*
- Tolerant of wider variety of soil types
- Tolerant of wider variety of light levels
- Mature quickly and produce lots of seeds



Siebold's Viburnum



Garlic Mustard



Japanese Barberry

# 2024 Target Species

84 plants + 49 “animals”=

# 133 TARGET SPECIES



## Target and Watch Species

- Stage 0 = 131
- Stage 1 = 34
- Stage 2 = 26
- Stage 3 = 14

• 74 Watch Species

• 97 Widespread Species

# Work smarter now or whine harder later!

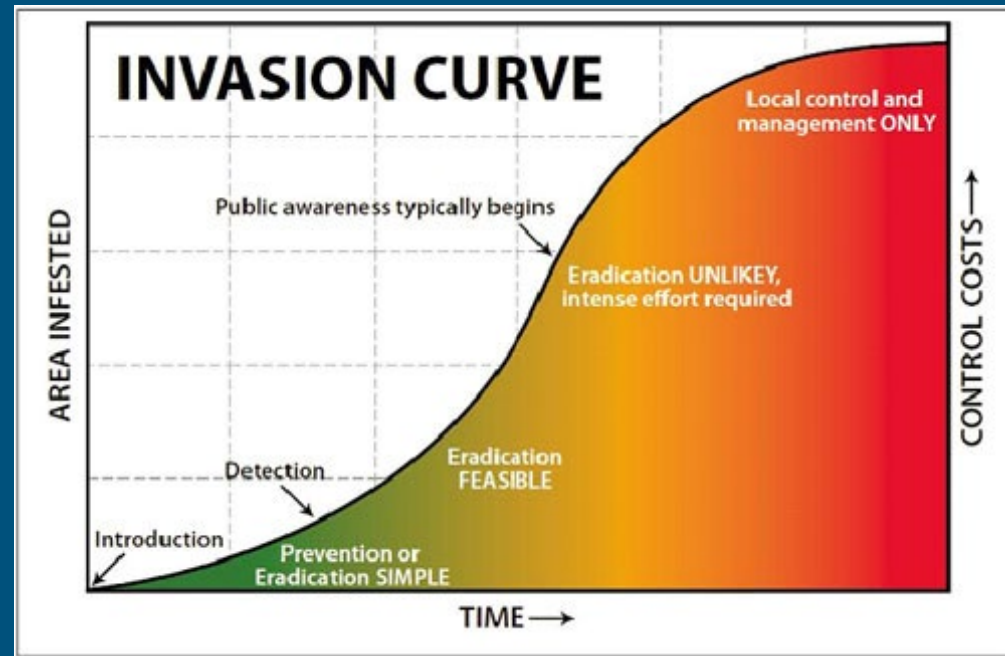


An ounce of prevention...



...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.



# Proposed Legislation

- Senate, No. 2186 – Greenstein and Smith
  - Prohibits sale of 30 invasive plants and re-establishes NJ Invasive Species Council
  - Examples: Callery Bear, Japanese Barberry, Winged Burning Bush, Mimosa, Chinese Silvergrass, English Ivy, Siebold's Viburnum, European Buckthorn, Japanese Aralia, Mimosa, Butterfly Bush, Japanese & Chinese Wisteria, Weeping Love Grass, Eurasian Water-milfoil
- Support from NJ Forest Task Force, NJ Nursery and Landscape Association, NJ Farm Bureau, NJ State Board of Agriculture
- Passed unanimously in the state Senate and Assembly in December 2023
  - Veto by Governor
  - Reintroduced unchanged as S1029 (required in new session)
  - Awaiting NJDEP amendment requests

New Jersey Invasive Species Strike Team  
2023 DO NOT PLANT LIST  
PLANTS ON THIS LIST ARE COMMONLY AVAILABLE FOR PURCHASE

Scientific Name	Common Name	Problem Type
<b>Herbaceous Plants</b>		
Agastache rugosa	Korean Hyssop	Potential
Cabomba caroliniana	Carolina fanwort	Emerging
Egeria densa	Brazilian waterweed	Emerging
Eichhornia crassipes	common water hyacinth	Emerging
Ludwigia peploides (ssp. glabrescens)	creeping waterprimrose	Emerging
Marsilea quadrifolia	European waterclover	Emerging
Myriophyllum aquaticum	parrotfeather	Emerging
Myriophyllum spicatum	Eurasian water-milfoil	Widespread
Nasturtium officinale	watercress	Widespread
Nymphoides peltata	yellow floating heart	Emerging
Pistia stratiotes	water lettuce	Emerging
Stratiotes aloides	water soldier	Emerging
Arundo donax	giant reed	Potential
Butomus umbellatus	Flowering Rush	Potential
Carex flacca	blue-green sedge	Potential
Cenchrus purpureus	black fountain grass	Potential
Cenchrus setaceus	black fountain grass	Potential
Eragrostis curvula	weeping lovegrass	Emerging
Miscanthus sinensis	Chinese silvergrass	Emerging
Saccharum ravennae	hardy pampas grass	Potential
Achyranthes japonica	Japanese chaff flower	Potential
Acorus calamus	American sweetflag	Widespread
Aegopodium podagraria	goutweed	Emerging
Artemisia stelleriana	oldwoman	Emerging
Arum italicum	Italian arum	Potential
Belamcanda chinensis	blackberry lily	Potential
Corydalis incisa	purple kerman	Emerging
Corydalis solida	spring fumewort	Emerging
Cyrtomium falcatum	Japanese net-veined holly fern	Potential
Hesperis matronalis	Dame's rocket	Potential
Hosta ventricosa	blue plantain lily	Emerging
Houttuynia cordata	chameleon-plant	Potential
Hyacinthoides hispanica	Hispanic hyacinthoides	Potential
Iris pseudacorus	yellow iris	Widespread
Lamium galeobdolon	yellow archangel	Potential
Leucocymum aestivum	snowbell	Potential
Lysimachia nummularia	creeping yellow loosestrife	Widespread
Lythrum salicaria	purple loosestrife	Widespread
Oenanthe javanica	Java dropwort	Emerging
Pachysandra terminalis	Japanese pachysandra	Potential
Perilla frutescens	beefsteakplant	Emerging
Persicaria orientalis	kiss me over the garden gate	Emerging
Ranunculus repens	creeping buttercup	Potential
Reynoutria japonica	Japanese knotweed	Widespread
Reynoutria sachalinensis	giant knotweed	Widespread
Reynoutria x bohemica	Bohemian knotweed	Widespread
Salvia glutinosa	Jupiter's distaff	Potential
Scilla siberica	squill	Potential
Silene flos-cuculi	ragged robin	Emerging
Tanacetum vulgare	common tansy	Potential
<b>Vines</b>		
Actinidia arguta	hardy kiwi	Emerging
Ampelopsis brevipedunculata	porcelain-berry	Widespread
Celastrus orbiculatus	Oriental bittersweet	Widespread
Clematis flammula	fragrant clematis	Emerging
Clematis terniflora	Japanese clematis	Widespread
Dioscorea polystachya	Chinese yam	Emerging
Euonymus fortunei	winter creeper	Emerging
Fallopia baldschuanica	Chinese fleecflower	Emerging
Hedera helix	English ivy	Widespread
Lonicera caprifolium	Italian woodbine	Emerging
Lonicera japonica	Japanese honeysuckle	Widespread
Parthenocissus tricuspidata	Boston ivy	Emerging
Pueraria montana var. lobata	kudzu	Emerging
Wisteria floribunda	Japanese wisteria	Emerging
Wisteria sinensis	Chinese wisteria	Emerging

Scientific Name	Common Name	Problem Type
<b>Shrubs</b>		
Berberis julianae	wintergreen barberry	Potential
Berberis thunbergii	Japanese barberry	Widespread
Berberis vulgaris	common barberry	Emerging
Buddleja davidii	butterflybush	Emerging
Citrus trifoliata	hardy orange	Emerging
Cytisus scoparius	Scotch broom	Emerging
Deutzia scabra	fuzzy pride-of-Rochester	Emerging
Elaeagnus angustifolia	Russian olive	Emerging
Elaeagnus pungens	thorny elaeagnus	Potential
Elaeagnus umbellata	autumn olive	Widespread
Eleutherococcus sieboldianus	five-leaf aralia	Emerging
Euonymus alatus	winged burning bush	Widespread
Euonymus europaeus	European spindle tree	Emerging
Frangula alnus	glossy buckthorn	Emerging
Hippophae rhamnoides	seaberry	Potential
Hydrangea paniculata	panicked hydrangea	Potential
Kolkwitzia amabilis	beautybush	Potential
Ligustrum amurense	amur privet	Potential
Ligustrum obtusifolium	border privet	Widespread
Ligustrum ovalifolium	California privet	Emerging
Ligustrum vulgare	European privet	Widespread
Lonicera fragrantissima	sweet breath of spring	Emerging
Lonicera maackii	Amur honeysuckle	Widespread
Lonicera morrowii	Morrow's honeysuckle	Widespread
Lonicera standishii	Standish's honeysuckle	Emerging
Lonicera tatarica	Tatarian honeysuckle	Widespread
Mahonia bealei	Beale's barberry	Emerging
Osmanthus heterophyllus	holly osmanthus	Potential
Photinia villosa	Oriental photinia	Widespread
Rhodotypos scandens	jetbead	Emerging
Ribes rubrum	garden red current	Emerging
Rosa canina	dog rose	Emerging
Rosa luciae	memorial rose	Potential
Rosa rugosa	seaside rose	Emerging
Rubus armeniacus	Himalaya blackberry	Emerging
Rubus laciniatus	cutleaf blackberry	Emerging
Rubus parvifolius	Western thimbleberry	Emerging
Spiraea japonica	Japanese spiraea	Emerging
Styrax japonicus	Japanese snowbell	Emerging
Symplocos paniculata	sapphire berry	Emerging
Viburnum dilatatum	linden viburnum	Widespread
Viburnum lantana	wayfaring tree	Emerging
Viburnum opulus	Guelder-rose	Emerging
Viburnum plicatum	Japanese snowball	Emerging
Viburnum setigerum	tea viburnum	Emerging
Viburnum sieboldii	Siebold's arrowwood	Emerging
<b>Trees</b>		
Acer ginnala	Amur maple	Emerging
Acer palmatum	Japanese maple	Emerging
Acer platanoides	Norway maple	Widespread
Acer pseudoplatanus	sycamore maple	Emerging
Akebia quinata	chocolate vine	Emerging
Albizia julibrissin	mimosa	Emerging
Alnus glutinosa	European black alder	Emerging
Aralia elata	Japanese angelica tree	Widespread
Broussonetia papyrifera	paper mulberry	Emerging
Cornus kousa	Kousa dogwood	Emerging
Kalopanax septemlobus	castor aralia	Emerging
Koelreuteria elegans	golden raintree	Potential
Magnolia kobus	Kobus magnolia	Potential
Malus toringo	Japanese crabapple	Emerging
Morus australis	Chinese mulberry	Potential
Paulownia tomentosa	princess tree	Widespread
Phellodendron amurense	Amur cork tree	Emerging
Populus alba	white poplar	Emerging
Populus x canadensis	gray poplar	Emerging
Prunus avium	sweet cherry	Widespread
Prunus subhirtella var. pendula	weeping Higan cherry	Emerging
Pyrus betulifolia	birchleaf pear	Potential
Pyrus calleryana	Callery pear (Bradford pear)	Widespread
Salix matsudana	Chinese willow	Potential
Ulmus parvifolia	Chinese elm	Emerging
Ulmus procera	English elm	Emerging
Ulmus pumila	Siberian elm	Emerging
Zelkova serrata	Japanese zelkova	Emerging



# STEWARDSHIP



# The Stewardship Effort Hierarchy



## Invasive Species Strategy

- Emerging Invasive Species Control / Eradication
  - Stage 0, then Stage 1, etc.
- Invasives on High Conservation Value Areas
  - Rare species habitat, old forests, etc.

# Current Strategies to Control Deer by Individual Landowners

- Recreational Hunting

Generally allowed by private residents concerned with deer overpopulation

- Pros: May reduce the most severe impacts of deer overabundance
- Cons: May not stimulate increased focus on does, which is required to significantly reduce populations

- Agricultural Depredation Permits

Generally conducted by farmers with high value row crops

- Pros: Increased deer herd reduction by removing constraints
- Cons: Limited to agricultural areas

- Deer Management Programs (Controlled Hunting)

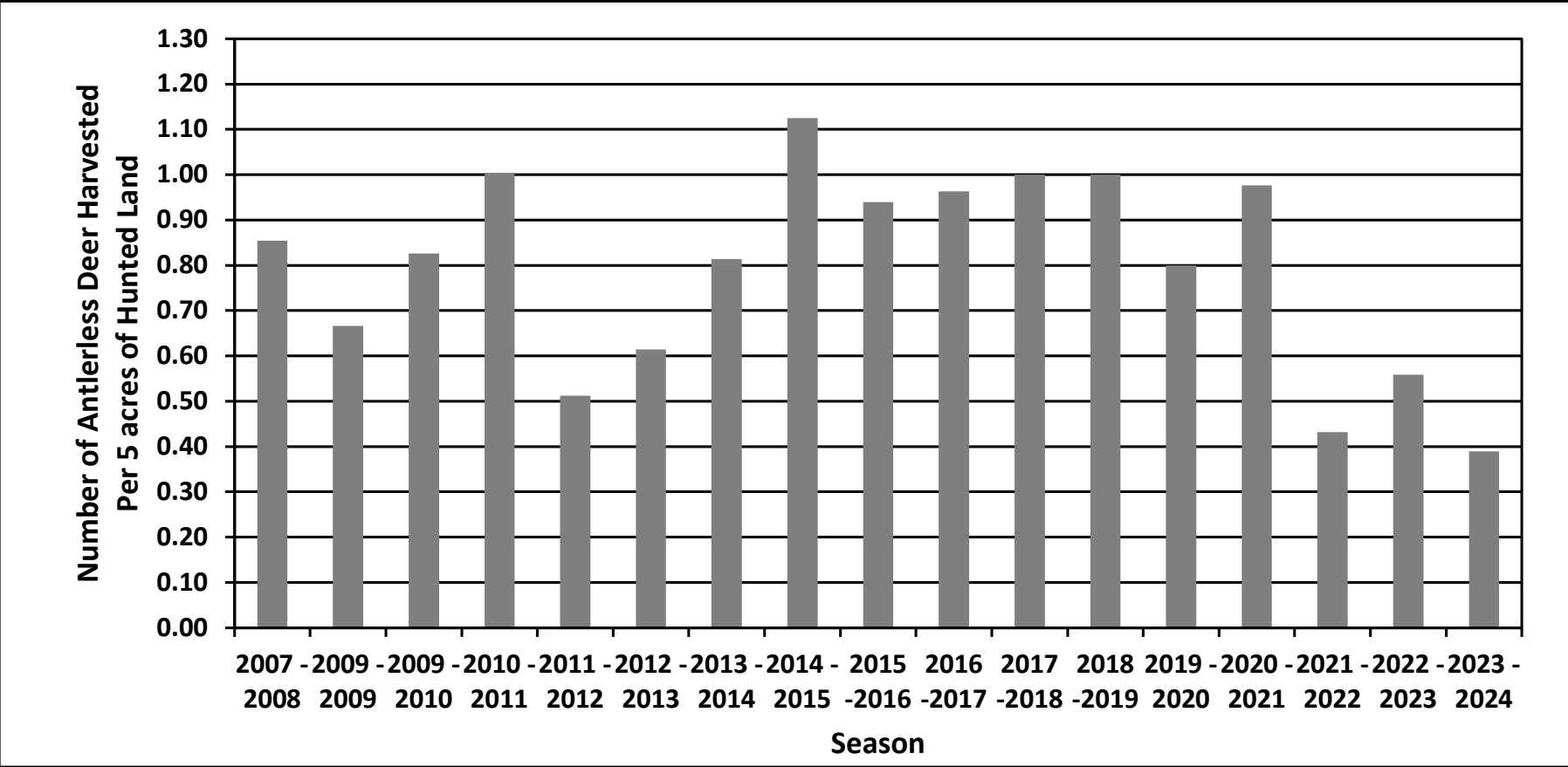
Generally conducted by land trusts and may involve deer drives and baiting

- Pros: May provide incentives to focus on does in return for hunting access
- Cons: Less effective on small parcels when neighboring parcels are not participating

**To achieve population reduction at scale, hunting efforts need to be coordinated to avoid “pushing” deer into safety zones.**



# FoHIVOS Deer Management Program Harvests







# Chemical Control: LEGAL REQUIREMENTS



[www.pcpnj.org](http://www.pcpnj.org)

- ❖ NJDEP regulates the use of herbicide in NJ
- ❖ Who can apply?
  - ✓ Certified “applicators” and “operators”
  - ✓ Non-certified participant under direct supervision of a “certified applicator”
- ❖ Basic training, testing, fees- available on website
- ❖ Label containers!
- ❖ Record of all herbicide applications
- ❖ Recommended: lock on door of storage facility
- ❖ Permits for wetland use (approved herbicides)



# Chemical Control: Foliar Spray (FS)

## Technique

- Plants < 4' to avoid spraying over head
- Wet all leaves with herbicide
- Glyphosate: 2%-5% (Ex. Rodeo)
- Triclopyr (amine): 2%-5% (Ex. Garlon 3)
- Use surfactant to increase sticking power
- Use dye to track treatment

## Pros

- Effective control
- Cost effective

## Cons

- Sensitive to weather conditions
- Potential for drift

## When

Annuals: Before seed set each growing season

Deciduous: Growing season

Evergreen: Year round (reduced non-target spraying)



# Chemical Control: Cut Stump (CS)

## Technique

- Cut *all stems horizontally* and *directly* (6" or less) above the ground, apply herbicide *immediately* on all exposed stumps
- Glyphosate: 50% (ex. Rodeo)
- Triclopyr (ester): 25% (ex. Garlon 4 Ultra)
- Herbicide dye for tracking treatment

## Pros

- Effective control
- Targeted control

## Cons

- Time consuming
- Stem removal required

## When

Year round **except for when sap is rising** (typically early spring). Fall is a highly effective time.



# Chemical Control: Basal Bark (BB)

## Technique

- Apply continuous band of **directly** to the bark
- Band should be 1 - 2 feet, depending on thickness of tree trunk
- Do not spray until dripping
- Triclopyr (ester): 25% (ex: Garlon 4 Ultra)

## Pros

- Effective control
- Targeted control
- Cost effective

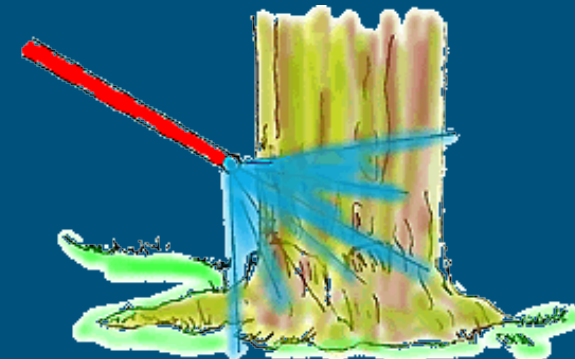
## Cons

- Not as effective on larger or thick-barked trees

## When

Year round

Avoid standing snow



# Recommended Mix Percentages

Percentages (volume/volume)													
General Application Method	NJISST Method ID	Glyphosate <sup>1</sup>	Triclopyr amine <sup>2</sup>	Triclopyr ester <sup>3</sup>	Clopyralid <sup>4</sup>	Aminopyralid <sup>5</sup>	2,4-D <sup>6</sup>	Prodiamine <sup>7</sup>	Quizalofop <sup>8</sup>	Surfactant <sup>9</sup>	Dye <sup>10</sup>	Water	Oil-based Diluent <sup>11</sup>
Foliar Spray	FS-1 - 'General Mix A'	3.75	2.50	--	--	--	--	--	--	0.50	Blue	93	--
Foliar Spray	FS-2 - 'General Mix B'	3.00	--	--	--	--	--	--	--	0.50	Blue	97	--
Foliar Spray	FS-3 - 'General Mix C'	5.00	--	--	--	--	--	--	--	0.50	Blue	95	--
Foliar Spray	FS-4 - 'Broadleaf Mix A'	--	2.50	--	--	--	--	--	--	0.50	Blue	97	--
Foliar Spray	FS-5 - 'Broadleaf Mix B'	--	--	1.70	--	--	2.70	--	--	0.50	Blue	95	--
Foliar Spray	FS-6 - 'Tough Aster Mix A'	--	--	--	0.63	--	--	--	--	0.50	Blue	99	--
Foliar Spray	FS-7 - 'Tough Aster Mix B'	--	--	--	--	0.27	--	--	--	0.50	Blue	99	--
Foliar Spray	FS-8 - 'Grass Mix A'	--	--	--	--	--	--	--	0.38	0.50	Blue	99	--
Basal Bark	BB-1	--	--	25	--	--	--	--	--	--	Red	--	75
Cut Stump	CS-1	50	--	--	--	--	--	--	--	--	Blue	50	--
Cut Stump	CS-2	--	50	--	--	--	--	--	--	--	Blue	50	--
Cut Stump	CS-3	--	--	25	--	--	--	--	--	--	Red	--	75
Hack-and-Squirt	HS-1	50	--	--	--	--	--	--	--	--	Blue	50	--
Hack-and-Squirt	HS-2	--	50	--	--	--	--	--	--	--	Blue	50	--
Hack-and-Squirt	HS-3	--	--	25	--	--	--	--	--	--	Red	--	75
Pre-Emergent	PE-1	--	--	--	--	--	--	*	--	--	*	*	--





**Bordentown City**  
**Table 2. Site Descriptions**

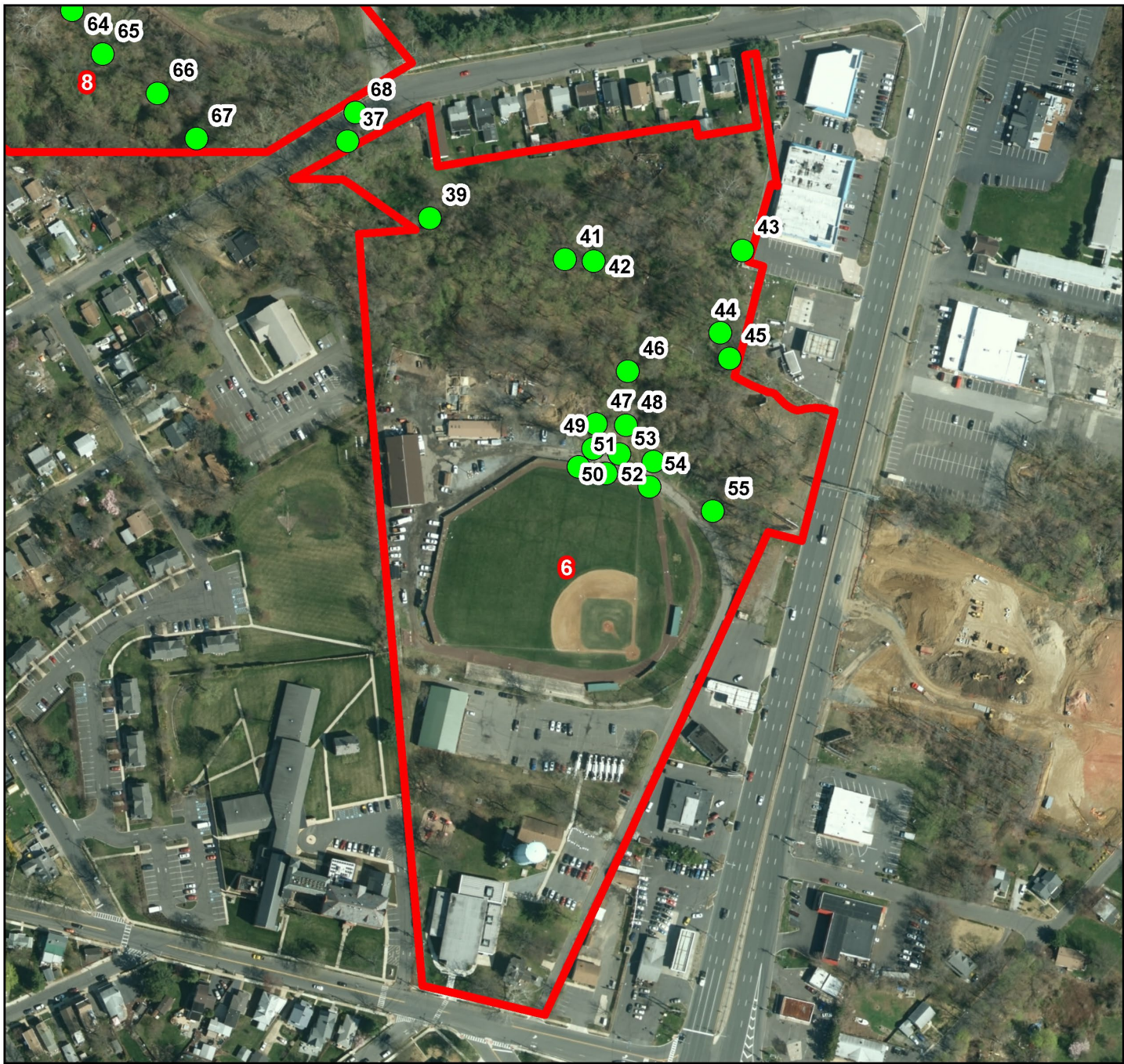
Site ID	Site Name	Broad Description
1	Lime Kiln Alley Park	Heavily degraded woodland; Multiple emerging invasive species; Heavy infestations of English Ivy, Porcelain-berry, Black Locust, Tree-of-Heaven, Japanese Clematis, Mugwort, Garlic Mustard and Chinese Bushclover. Wetland and transitional meadow habitat with several threatening invasives that have not yet become overly abundant.
2	Blacks Creek Overlook	Manicured area / forest area to east has non-native tree canopy of Catalpa and Norway Maple; Area to the west is relatively intact freshwater marsh with few invasives
3	Oliver Street Park	Open, heavily invaded forest with many invasive species; Very abundant species include Chinese Wisteria, Japanese Clematis, and English Ivy; Two exceptionally large Tulip Poplar trees are being strangled by wisteria.
4	Bordentown Beach	Very heavily degraded forest with dense, nearly impenetrable Border Privet infestation; Japanese Clematis infests all canopy gaps
5	Hilltop Park	Heavily infested forests; Western portion dominated by non-native Black Locust and eastern portion dominated by Norway Maple (but moderate amounts of native Spicebush occur in the understory of this steep forest). The native plant garden contains small amounts of Porcelain-berry, Mugwort, Japanese Clematis, Tree-of-Heaven, and Chinese Yam.
6	Gilder Memorial Park	Mature forest featuring several large Tulip Poplar; eastern portion features patches of Spicebush and some tree regeneration (seedlings > 3' tall, White Ash, Boxelder). It is possible the highway, steep slopes and stream reduce deer traffic, allowing some native plant growth in the understory. There is an informal trail system in the east near the highway. <b>Relatively high quality site.</b>
7	Undeveloped parkland	Dense ground layer and climbing English Ivy throughout this small area. Several very large specimens of Sycamore and Tulip Poplar.
8	Ann/Spring Street Park	Mature forest featuring several large Tulip Poplar and White Oak, and a small Spicebush thicket on a floodplain. Heavy infestation of Multiflora Rose and other species. <b>Relatively high quality site.</b>

**Bordentown City****Table 5. Summary of Selected Invasive Species Points**

Common Name	Population Size					Totals
	1	2-10	11-100	101-1000	> 1000	
Callery Pear		4	1			5
Chinese Bushclover					1	1
Chinese Yam		1		1	1	3
Chinese Wisteria		1	2		2	5
Common Reed			2			2
Japanese Clematis		1	3	1	2	7
Japanese Holly		1				1
Japanese Hops		1	2		1	4
Japanese Knotweed			3	2		5
Japanese Maple		1				1
Japanese Zelkova		1				1
Mimosa		4				4
Mugwort			1			1
Paper Mulberry			1			1
Porcelain-berry			5		4	9
Siebold's Crabapple		2				2
Tea Viburnum		1				1
Tree-of-Heaven		3	5			8
Wintercreeper		1	1	3	1	6
Yellow Archangel			1			1
<b>Totals</b>	<b>1</b>	<b>22</b>	<b>27</b>	<b>7</b>	<b>12</b>	<b>68</b>

## Site 6. Gilder Memorial Park - Stewardship Summary

Goal	Relative Priority	Description	Volunteers	Public Works	Contractors
1	Very High	Implement an effective Deer Management Plan to allow native species to better compete with invasive species	X - Municipal officials and Environmental Commission		
2	Very High	Eradicate Chinese Yam, Mimosa, Japanese Hops, Callery Pear, Siebold's Crabapple, -- then Japanese Holly, Japanese Knotweed,			X - Herbicide treatments
3	High	Control of Porcelain-berry, Wintercreeper, English Ivy, Japanese Clematis, -- then Border Privet, Mugwort, Multiflora Rose, Wineberry, Amur Honeysuckle, Black Locust, Norway Maple, Japanese Honeysuckle	X - Cut vines out of trees and forest edges		X - Herbicide treatments
4	Moderate	Watch for new establishment and treat as necessary for highly threatening species including Linden Viburnum, Siebold's Viburnum, Oriental Photinia, European Buckthorn, and Japanese Aralia	X - Searching		X - Herbicide treatments as detected



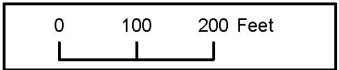
**Bordentown City  
Invasive Species  
Evaluation**

2021

See Table "Selected  
Invasive Species Points"  
for point ID key

**Legend**

- Selected Invasive Points
- Bordentown Properties

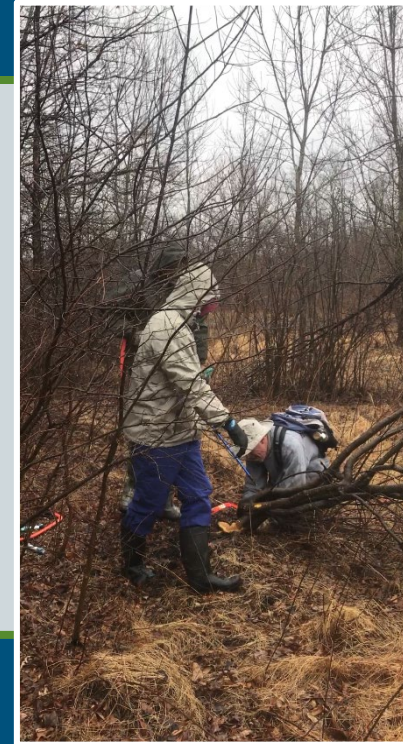


# Volunteer Stewardship Teams

- Friends of Great Swamp
- Watchung Reservation Invasive Plant (WRIP) Strike Force
- Ridgeview Woods
- Foote's Pond
- And over 20 more!

**“The lesson I take from more than a decade of volunteer and professional land stewardship is that remarkable progress is the predictable result of steady, low-technology land management.”**

**- Jennifer Hillmer, Land Steward**



# Volunteer Stewardship Teams Secrets to Success



- > Good communication with landowner
- > Core of 1-3 group leaders and a pool of at least 10-15 available volunteers
- > Predictable workdays (e.g., every other Saturday from 9am-Noon) allowing a larger volunteer pool to plug into efforts as their time allows.
- > Create and follow a concise long-term plan with annual work plans that identify digestible tasks that can be ‘checked off’
- > Include the fun stuff too! Invasive control alone is much less rewarding without some planting of native trees, shrubs, and wildflowers.
- > Lean on each other’s expertise!

# Q & A

Michael Van Clef, Ph.D.

- [mvanclef@fohvos.org](mailto:mvanclef@fohvos.org)
- 908.528.6674
- [FoHVOS.org/invasive-species-strike-team/](http://FoHVOS.org/invasive-species-strike-team/)

## 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

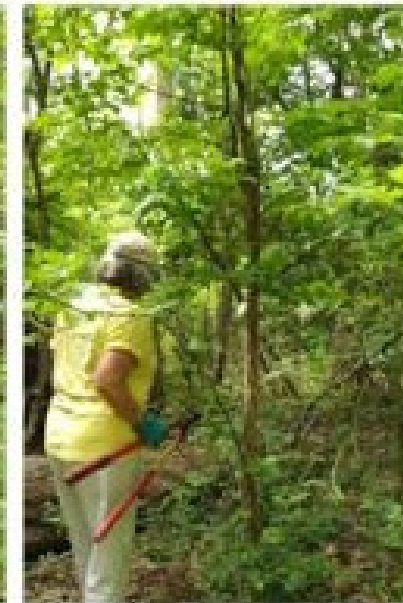


# SUSTAINABILITY SUMMIT



## Case Study: Eatontown

Laura Bagwell, Chair  
Eatontown Environmental Commission







# Land Management Triage in the Borough of Eatontown

Sustainable Jersey's Sustainability Summit

Bell Works, Holmdel, NJ

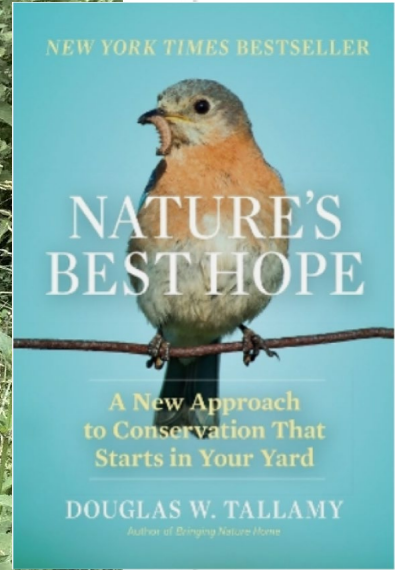
May 3, 2024

By Laura Bagwell, Chair

Eatontown Green Team & Environmental Commission

# Why work on Native & Invasive plants?

- Appreciate the land
- Responsible stewards
- Not just in my backyard
- Ecological survival / health



# Monmouth Invasive Species Strike Team

- Master Gardeners!
- Created Monmouth Invasive Species Strike Team (MISST) 2021
- Ann got some articles about invasives in the local paper
- Hosted Invasive ID trainings by Mike Van Clef in Eatontown, Ocean, Colts Neck
- Goal to set up / encourage local teams



# Eatontown's Invasive Plant ID Training

5/22/21

- Mike Van Clef lead the training
- Arboretum
- 3 hours
- Free
- All welcome / invited



MONMOUTH INVASIVE SPECIES  
STRIKE TEAM PRESENTS

## IDENTIFY & MANAGE INVASIVE PLANTS

by Mike Van Clef, PhD

Saturday, May 22, 2021  
9AM - Noon

FREE. TO PROTECT AGAINST COVID-19, SPACE  
IS LIMITED. RSVP TO LAURA, AT  
LBAGWELLS@VERIZON.NET

Meet at the parking lot at F. Bliss Price  
Arboretum & Wildlife Sanctuary,  
Wyckoff Road, Eatontown.

Hosted by the Eatontown Environmental Commission



# Mike Van Clef's Report

- Provided structure & strategy
- Very High Priority
  - Asiatic bittersweet
  - English Ivy
  - Porcelainberry
- High Priority
  - Garlic mustard
  - Wineberry



# Starting an Eatontown Strike Team: Finding allies

May - August 2021

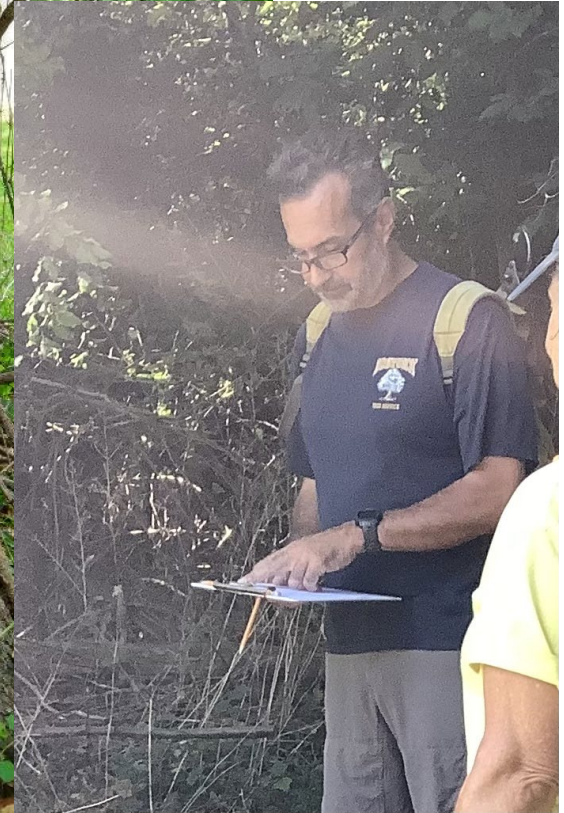
- Need for a team has been established  
————->
- Collaboration / Buy-In
  - Shade Tree Commission
  - Beautify Eatontown
  - Department of Public Works
  - Environmental Commission
  - Green Team



# Finding a Partner

## Shade Tree Commission

- June 2021 meeting with Chair to discuss strike team
- Goals:
  - Arboretum focus for now
  - Start slow / small work area
  - Volunteers - local residents who are trained/ gardeners
  - 5-10 volunteers
  - Hand tools only / no chemicals
  - Native woodland planting w/ fence
  - Native perennial garden w/o fence



# Our First Invasives “Work Party”



## **MONMOUTH INVASIVE SPECIES STRIKE TEAM WORK PARTY**

*In partnership with the*  
Eatontown Environmental Commission, Shade Tree Commission,  
Beautify Eatontown, Green Team & Department of Public Works

**Saturday, September 18, 2021**  
**8:30 - 10:30AM**

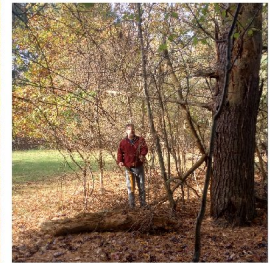
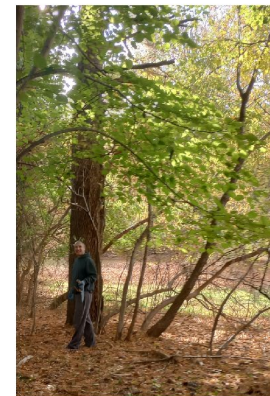
**F. Bliss Price Arboretum & Wildlife Sanctuary**  
**Wyckoff Road, Eatontown**

*Help manage invasive vines and plants at the Arboretum!*  
*RSVP to Laura at [L.Bagwell13@verizon.net](mailto:L.Bagwell13@verizon.net) for details*









# Invasive mitigation methods

So far...we are still learning

- **Garlic mustard**

- April - June
- hand pulling entire plant before they go to seed, then bagging them and disposing of the bags

- **Vines (asiatic bittersweet / porcelainberry / English ivy)**

- All year
- window cutting/ cutting at ground level then cutting again at eye level, if possible

- **Wineberry**

- All year
- snipping at ground level / digging it out



# Guidance

- Leave trimmings as much as possible
- Low / No Cost
- Signs help
- Consistent work party dates
- 1.5 - 2 hours
- Have a partner / gym buddy system



- **INVASIVE PLANT SPECIES  
MANAGEMENT AREA** -

**WORK IN PROGRESS**

*A PARTNERSHIP WITH THE  
MONMOUTH INVASIVE SPECIES STRIKE TEAM  
AND EATONTOWN'S*

- ENVIRONMENTAL COMMISSION
- SHADE TREE COMMISSION
- GREEN TEAM
- BEAUTIFY EATONTOWN
- DEPARTMENT OF PUBLIC WORKS

# County Invasive Plant Strike Team

## Monmouth County

- The County started a strike team volunteer trainings in 2023
- Twice weekly work parties
- Work with ecologists and other seasoned park staff
- Highly recommend



# Plant & Promote Natives!

- Pollinator garden / August 2020
- Pollinator plant swap / May 2021
- Native plant ordinance / Planning & Zoning / March 2022
- Sustainable Land Use Pledge / April 2022
- Green Grounds & Maintenance Policy / May 2022
- Abuzz for Wildlife in Eatontown - NWF Certified Wildlife Habitat / August 2022
- Mayor's Monarch Pledge - to plant essential monarch habitat / March 2023 - present
- Native planting with preschool children / May 2023
- Abuzz Open House - Native plant lecture / March 2024



# More land stewardship

- Reduce pesticide use / IPM
- DPW green infrastructure strike team
- No Mow / No Blow areas
- Consider a Conservancy
- Lighting ordinance
- Advocacy



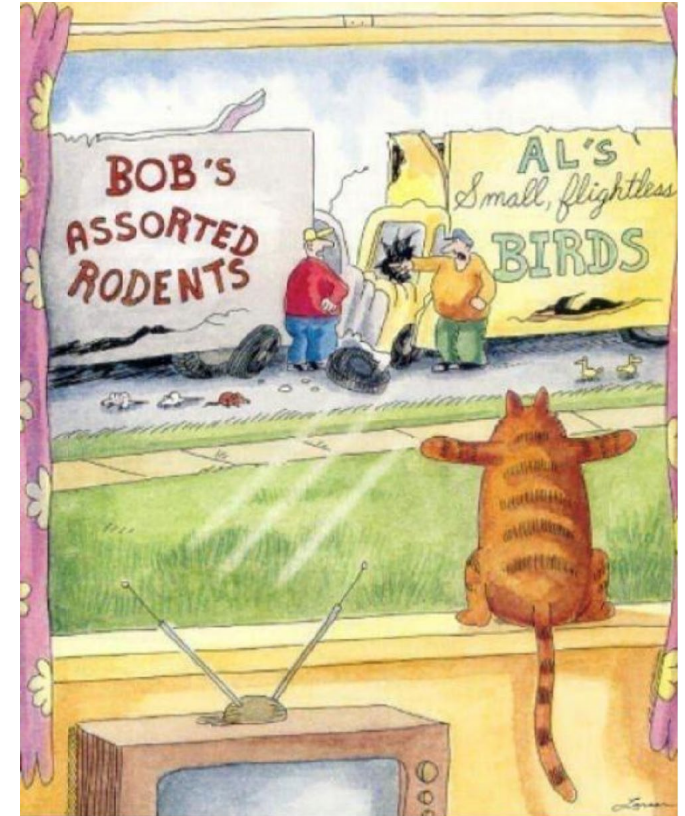
Thank You!

**Laura Bagwell**

**Eatontown Green Team & Environmental  
Commission**

[L.Bagwell3@verizon.net](mailto:L.Bagwell3@verizon.net)

**(732) 533-3951**





# SUSTAINABILITY SUMMIT



## Stormwater basin Retro-fit

Dr. Clay Emerson, Senior Technical Director  
Princeton Hydro



# STORMWATER BASIN RETROFIT



Clay Emerson PhD PE CFM  
May 3, 2024

[PRINCETONHYDRO.COM](http://PRINCETONHYDRO.COM)



# OVERVIEW

- Why retrofit stormwater basins?
- What is a basin retrofit?
- What makes a good candidate for a retrofit?
- Key considerations and resources.

# STORMWATER MANAGEMENT IS CHANGING

- **Shift in Land Use in New Jersey**
- **Updates to NJDEP's Stormwater Rule (2020 & 2023)**
- **MS4 Permit Updates for Municipal Requirements**
- **Outdated Infrastructure is Easy to Find**
- **Need to get more function from less space!**



*What's not to like?*



SCIENCE  
ENGINEERING  
DESIGN

# WHY RETROFIT/NATURALIZE BASINS?

## *Why do people rob banks?*

Because that's where the money goes.

## *Why retrofit stormwater basins?*

Because that's where all the runoff flows!



# WHY RETROFIT/NATURALIZE BASINS?

- Water quality
- Flood reduction and other hydrologic benefits
- Reduced O&M costs
- Aesthetics
- Ecological uplift
- Demonstration/Education



# WHY RETROFIT/NATURALIZE BASINS?



Global Ecology and Conservation

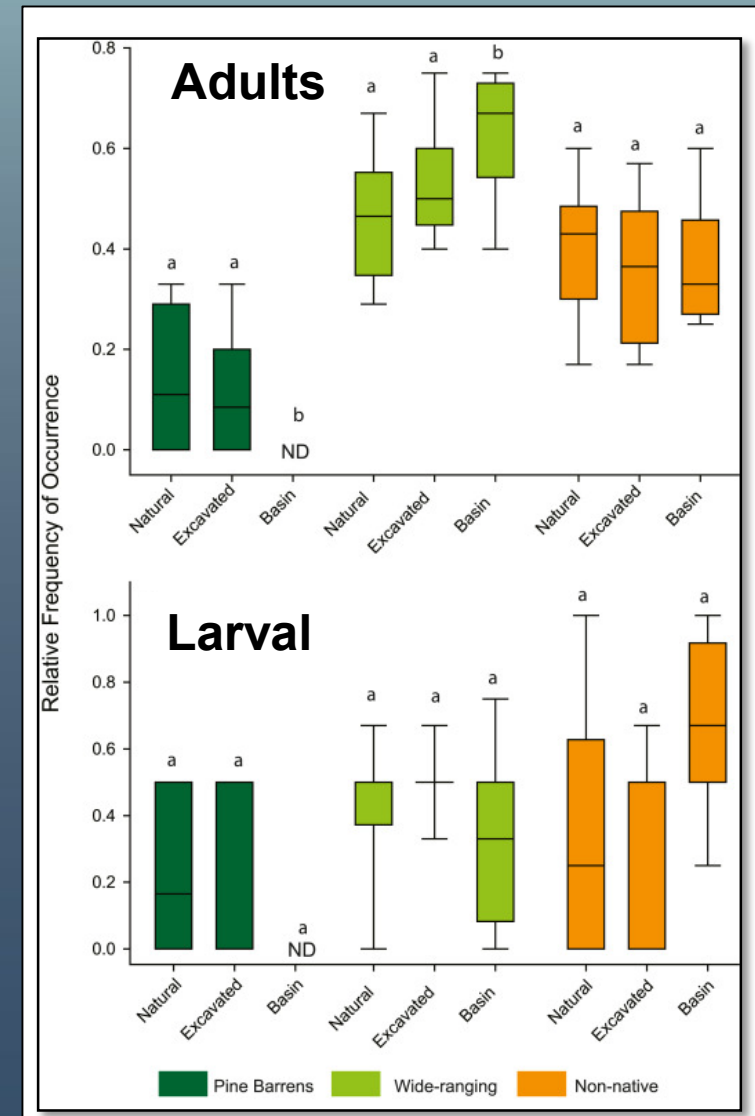
Volume 30, October 2021, e01765



## Assessing the ecological functionality and integrity of natural ponds, excavated ponds and stormwater basins for conserving amphibian diversity

Kelly L. Smalling <sup>a</sup>, Sara E. Breitmeyer <sup>a</sup>, John F. Bunnell <sup>b</sup>, Kim J. Laidig <sup>b</sup>, Patrick M. Burritt <sup>b</sup>, Marilyn C. Sobel <sup>b</sup>, Jonathan A. Cohl <sup>a</sup>, Michelle L. Hladik <sup>c</sup>, Kristin M. Romanok <sup>a</sup>, Paul M. Bradley <sup>d</sup>

Stormwater basins...can and do provide beneficial habitat for aquatic organisms particularly in fragmented environments where water is scarce and habitat is limited.





# WHAT IS A STORMWATER BASIN RETROFIT?



- Modifications to an existing basin to provide enhanced water quality and/or hydrologic function.
- For the purpose of this discussion, basin “naturalization” is considered a retrofit.



SCIENCE  
ENGINEERING  
DESIGN

# 12-year Retrospective Survey of 111 Basins:



Over time, trees will often win the battle for sunlight.



Cattail and phragmites will battle in wet areas.



Some native plants can hold their own.

# The retrofit approach must fit the opportunity!

- May simply entail minor changes to maintenance practices.
- Could involve significant earth disturbance and major construction.





SCIENCE  
ENGINEERING  
DESIGN

**What makes a good candidate?**

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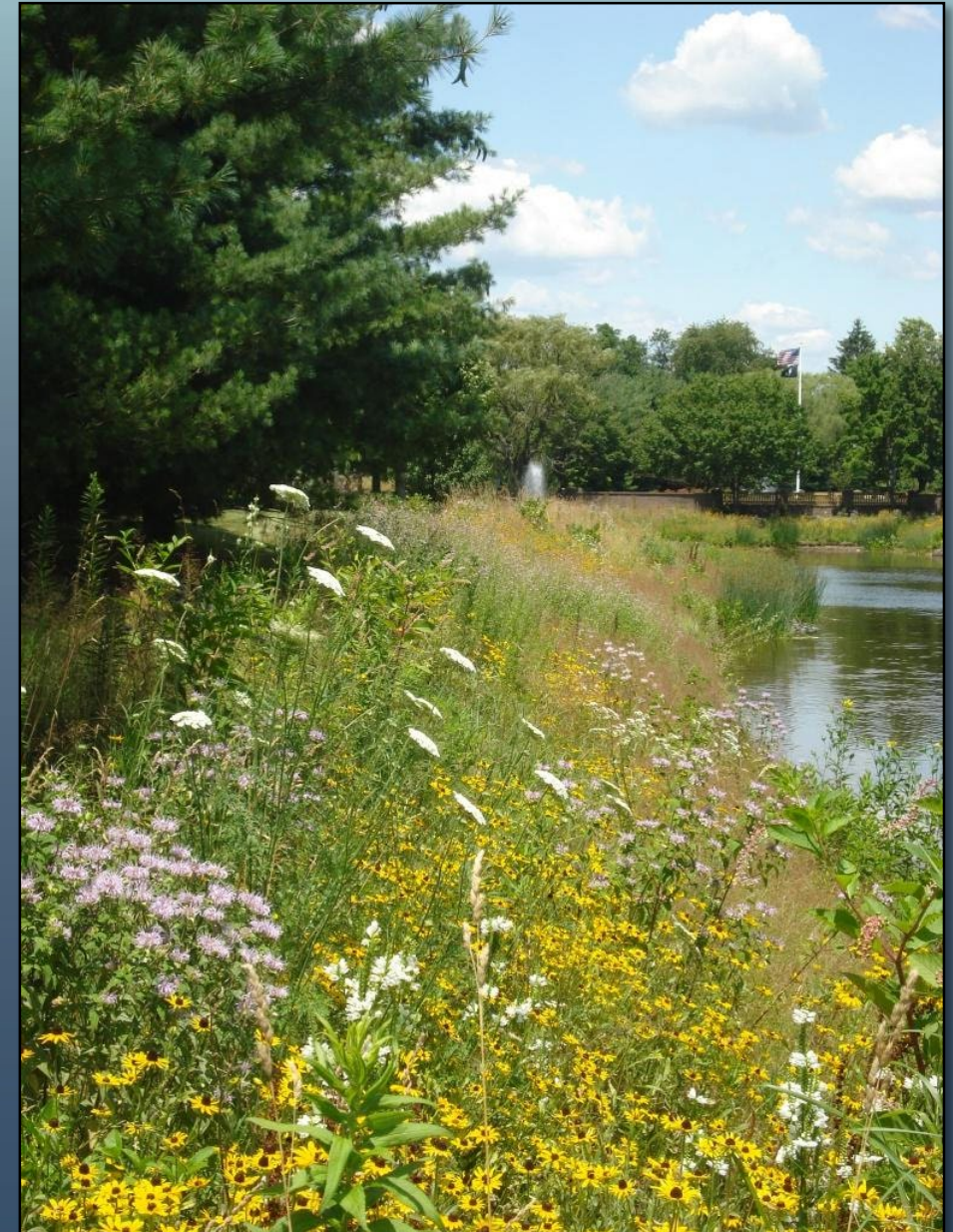
SCIENCE  
ENGINEERING  
DESIGN

# What makes a good candidate?

PRINCETONHYDRO.COM



# Don't rule out wet ponds.



# BASIN RETROFITS/NATURALIZATION



- Must respect or improve on the original design function and hydraulics.
- Need to have coordinated stakeholders, a plan and ideally a local champion.



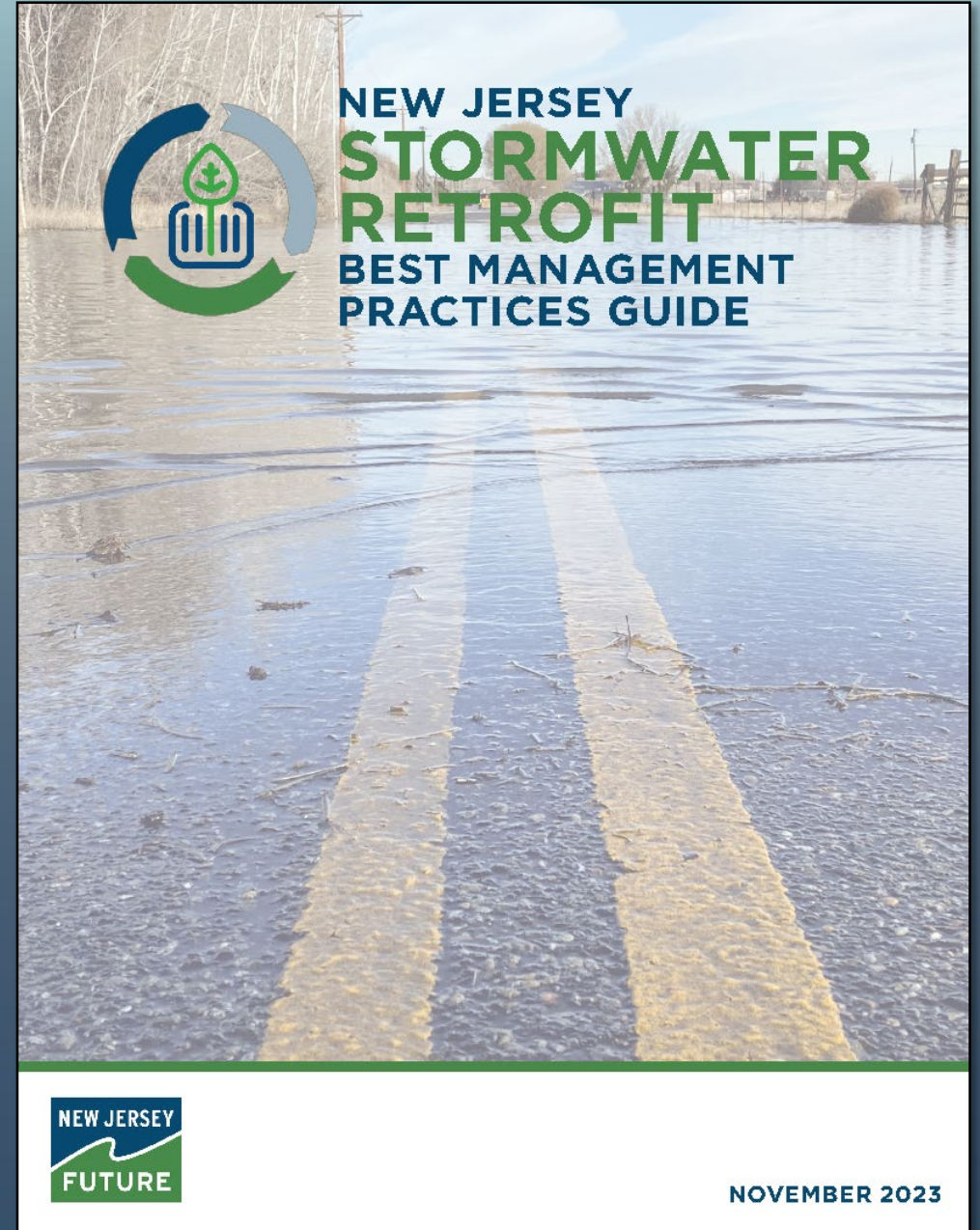
- Mow around all critical infrastructure, especially the outlet control structure.
- You cannot maintain what you cannot see.



Mowed edges show intent and improve overall aesthetics.



The new retrofit guide covers a wide variety of retrofits, including basin retrofits.



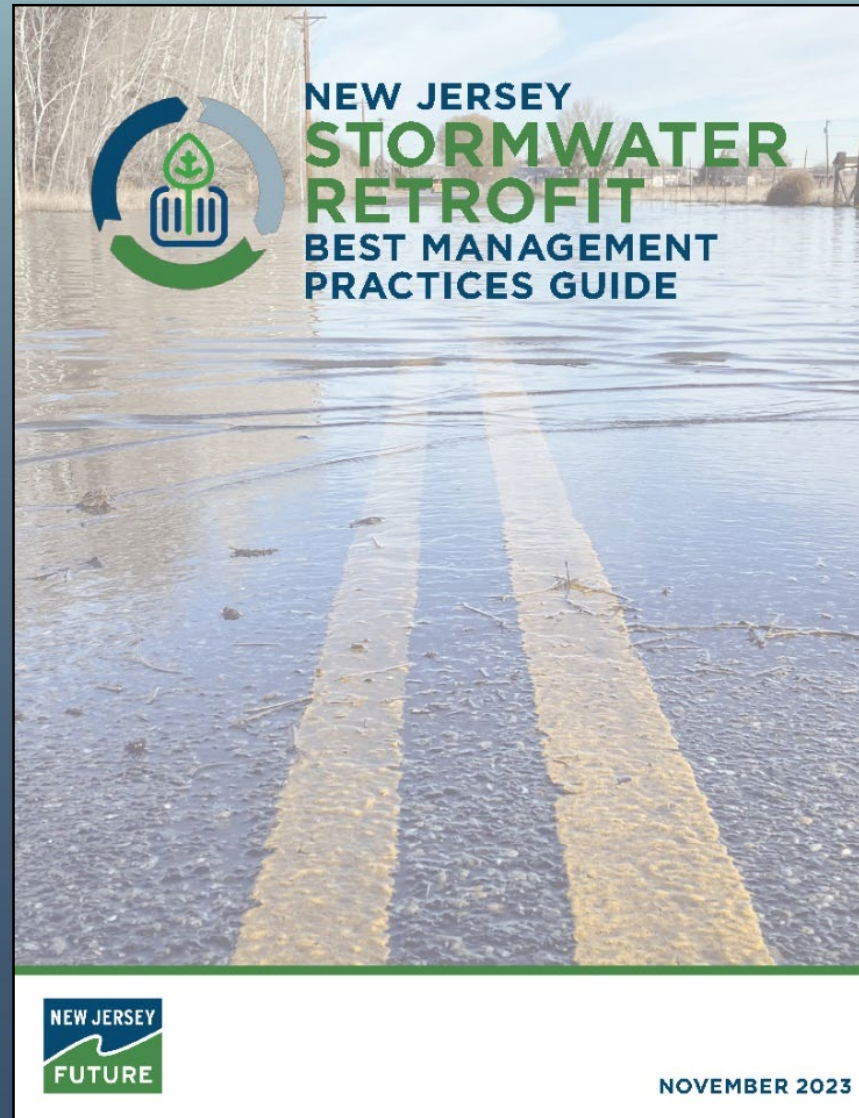
## WHAT?

Guidance document providing best practices for retrofitting stormwater infrastructure to improve functionality.  
Includes natural features such as green infrastructure.

## WHO?

### Audience Targets:

- Local & County Gov't
- NGOs
- Developers and Property Owners



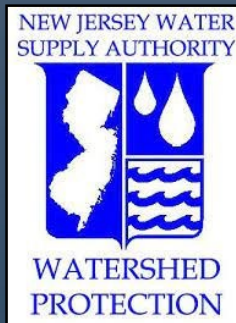
## WHY?

Fill current gaps in retrofit guidance related to stormwater management in New Jersey

## HOW?

- Useful for MS4 permit compliance
- Help with project identification and design
- Foster public-private partnerships

The guide contains examples including the NJWSA Franklin Township basin retrofit project.





SCIENCE  
ENGINEERING  
DESIGN

PRINCETONHYDRO.COM

NEW JERSEY V  
SUPPLY AUT





**CLAY EMERSON PHD PE CFM**

**Senior Technical Director**

**[cemerson@princetonhydro.com](mailto:cemerson@princetonhydro.com)**

# UPCOMING EVENTS AND OPPORTUNITIES

## □ EARNING YOUR DIGITAL SCHOOLS STAR: TIPS FOR SUCCESS WEBINAR

This webinar offers an overview of the Digital Schools program, insights and examples of ways to improve digital school action submissions and earn points to attain Digital Schools Star recognition. The informational webinar will be held on **Wednesday, May 8, 2024, 3:30pm-4:30pm.**

Register: [bit.ly/4dhdj91](https://bit.ly/4dhdj91)

## □ 2024 MUNICIPAL CERTIFICATION CYCLE

The next deadline to apply for certification is **Friday, May 10, 2024.** The final application deadline is **Wednesday, July 31, 2024.** View the full cycle timeline on the 2024 Certification Cycle page.

Learn More: [bit.ly/SJ2024CertCycle](https://bit.ly/SJ2024CertCycle)

## □ NJBPU'S COMMUNITY ENERGY PLANNING GRANTS

The New Jersey Board of Public Utilities is offering a new round of Community Energy Plan Grants for all New Jersey municipalities.

Application Deadline: **Friday, May 24, 2024**

Learn More: [bit.ly/3WcmAt7](https://bit.ly/3WcmAt7)

## □ TRI-COUNTY SUSTAINABILITY GENERAL MEETINGS

This Sustainable Jersey Regional Hub will host virtual meetings on a variety of sustainability topics throughout the year. The next meeting is **Tuesday, May 28, 2024, 7:00pm-8:00pm.**

Learn More: [bit.ly/Tri-CountySustainability](https://bit.ly/Tri-CountySustainability)

## □ 2024 SUSTAINABLE COMMUNITIES GRANT PROGRAM

Atlantic City Electric is contributing \$35,000 to support municipal environmental stewardship and resiliency projects within its service territory. Join us for an informational webinar on **Monday, May 13 from 1:00pm-2:00pm** to learn more about the program and how to use the online application portal.

Application Deadline: **Thursday, June 27, 2024**

Learn More: [bit.ly/SustainableCommunitiesGrantProgram](https://bit.ly/SustainableCommunitiesGrantProgram)

## □ 2024 SCHOOL CERTIFICATION CYCLE

The final deadline to apply for certification and Digital Schools Star Recognition is **Thursday, June 13, 2024.** View the full cycle timeline on the 2024 Certification Cycle page.

Learn More: [bit.ly/SJS2024CertCycle](https://bit.ly/SJS2024CertCycle)

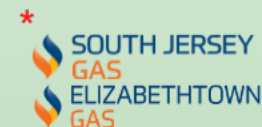
## □ HOW TO ADOPT OR UPDATE A COMPLETE AND GREEN STREETS POLICY WEBINAR

**Save the date!** Join a one-hour walkthrough on how to create your own model municipal Complete and Green Streets Policy, brought to you by the Voorhees Transportation Center at Rutgers University, Sustainable Jersey, the New Jersey Department of Transportation, and the North Jersey Transportation Planning Authority, on **Tuesday, September 17, 2024, 12:00pm-1:00pm.** Registration information coming soon. Follow-up Open House Q&A for attendees to be held virtually on **Wednesday, October 30, 2024 from 3:00pm-5:00pm.**

## PROGRAM UNDERWRITERS



## CORPORATE SPONSORS



\*Digital Schools Sponsor

# Questions ?



Michael Van Clef,  
New Jersey Invasive Species  
Strike Team  
[Mike.vanclef@gmail.com](mailto:Mike.vanclef@gmail.com)



Laura Bagwell,  
Chair, Eatontown  
Environmental Commission  
[l.bagwell3@Verizon.net](mailto:l.bagwell3@Verizon.net)



Clay Emerson,  
Senior Technical Director,  
Princeton Hydro  
[cemerson@princetonhydro.com](mailto:cemerson@princetonhydro.com)

# Land Management Triage

## Additional Resources



New Jersey Invasive Species Strike Team



2023 Do Not Plant List – New Jersey Invasive Species Strike Team



Laura Bagwell & Eatontown – 2022 Sustainability Hero –



Eatontown Ordinance 05-2022, Native Plants and Trees



New Jersey Stormwater Retrofit Best Management Practices Guide



Lower Raritan Watershed Partnership Newsletter - Field Trip to Franklin Township Stormwater Basins



# 2024 SUSTAINABILITY SUMMIT



## CEU SIGN OUT



### QR CODE INSTRUCTIONS:

1. Open the Camera app on your phone.
2. Hold your phone so that the QR code appears in view.
3. Tap the notification to open the link.
4. You **MUST** Sign out to receive CEU credits.

### WIFI INFORMATION: 2 Open Networks

1. **sustainablenj**: Ballroom, GS3, Nonprofit Exhibit area
2. **Bell\_Works\_Conf\_Center**: Bell Theatre & Conference

# SUSTAINABILITY SUMMIT



# Thank You

Session slides will be available on [sustainablejersey.com](https://sustainablejersey.com) by 5/10.

# SUSTAINABILITY SUMMIT

