

# Native Ferns as a Biological Control for *Microstegium Viminium*

Bob Gale



# Wetland Description

- Protected 35-acre tract in a river floodplain
- Surrounded on all sides by foot of mountain slope and two-lane highway
- Separated from riparian corridor by the highway
- Floods during extreme events
- Drains rapidly following precipitation
- Invaded by Japanese stiltgrass (*Microstegium viminium*) from adjacent upland

# Forest Community Types

- Montane Alluvial Forest--Large River Subtype

River Birch

White pine

Ironwood

Sycamore

Southern red oak

American holly

American ash

Cinnamon fern

Doghobble

Red maple

Christmas fern

New York Fern

- Montane Floodplain Slough Forest

Red maple

Arrowood

Sedge spp.

Tag Alder

Mtn. Winterberry

Arrowhead

Silky Dogwood

Spicebush

Sensitive Fern

Netted Chain-fern

# Existing Native Ferns

**New York Fern** - *Parathelypteris  
noveboracensis*



**Netted Chain-fern** - *Lorinseria  
aereolata*





# New York Fern Colony





# Netted Chain-fern Colony





# Stiltgrass – Halted by New York Fern





# Stiltgrass halted by Netted Chain-fern





# 2017-- “Duh!” Moment

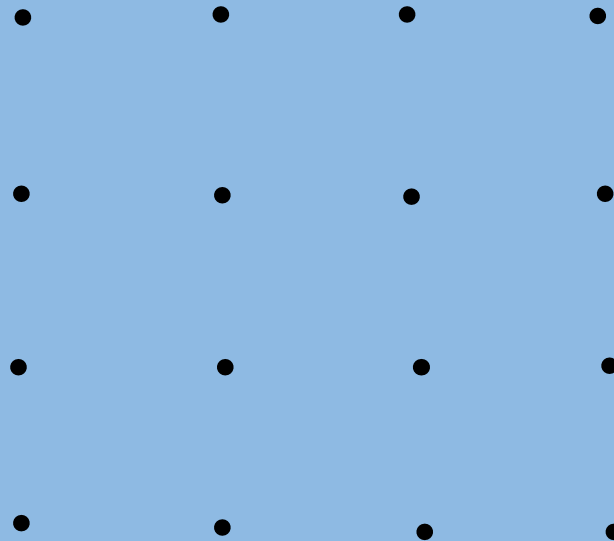


- Could these ferns be intentionally planted as a biological control?
- Obtained permission for experimental plots
- 2019-- Established test plots

# Plot Design

- 2 plots in middle of stiltgrass invasion
- 2 plots adjacent to advancing *Microstegium*
- (No uninvaded saturated soil area located)

- 16 Plants
- Square Grid
- 1' Spacing





# Plot 1- NY Fern - (Uninvaded)





# Plot 2 - NY Fern - (Invaded)





# Plot 3 – Netted Chain-fern – (Invaded)



# Plot 1 (Uninvaded) Monitoring Changes

<b>PLOT 1 (New York Fern)</b>	<b># Plants</b>	<b># Stems</b>	<b>Fern Cover</b>	<b>Stiltgrass Cover</b>
<b>YEAR 1</b>	13	30	6%	0%
<b>YEAR 2</b>				
<b>YEAR 3</b>				
<b>YEAR 4</b>				



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<b>YEAR 1</b>	13	30	6%	0%
<b>YEAR 2</b>	26	128	35%	2%
<b>YEAR 3</b>				
<b>YEAR 4</b>				

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<b>YEAR 1</b>	13	30	6%	0%
<b>YEAR 2</b>	26	128	35%	2%
<b>YEAR 3</b>	26?	256	70%	20%
<b>YEAR 4</b>	Indeterminate	458	90%	12%

# Plot 2 (Invaded) Monitoring Changes

<b>PLOT 2 (New York Fern)</b>	<b># Plants</b>	<b># Stems</b>	<b>Fern Cover</b>	<b>Stiltgrass Cover</b>
<b>YEAR 1</b>	15	120	25%	75%
<b>YEAR 2</b>				
<b>YEAR 3</b>				
<b>YEAR 4</b>				

# Plot 2 (Invaded) Monitoring Changes

<b>PLOT 2 (New York Fern)</b>	<b># Plants</b>	<b># Stems</b>	<b>Fern Cover</b>	<b>Stiltgrass Cover</b>
<b>YEAR 1</b>	15	120	25%	75%
<b>YEAR 2</b>	22	271	25%	95%
<b>YEAR 3</b>				
<b>YEAR 4</b>				

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<b>PLOT 2 (New York Fern)</b>	<b># Plants</b>	<b># Stems</b>	<b>Fern Cover</b>	<b>Stiltgrass Cover</b>
<b>YEAR 1</b>	15	120	25%	75%
<b>YEAR 2</b>	22	271	25%	95%
<b>YEAR 3</b>	Indeterminate	687	85%	30%
<b>YEAR 4</b>				



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<b>PLOT 2 (New York Fern)</b>	<b># Plants</b>	<b># Stems</b>	<b>Fern Cover</b>	<b>Stiltgrass Cover</b>
<b>YEAR 1</b>	15	120	25%	75%
<b>YEAR 2</b>	22	271	25%	95%
<b>YEAR 3</b>	Indeterminate	687	85%	30%
<b>YEAR 4</b>	Indeterminate	900	95%	8%

# Plot 3 (Invaded) Monitoring Changes

<b>PLOT 3</b> (Netted Chain Fern)	# Plants	# Stems	Fern Cover	Stiltgrass Cover
<b>YEAR 1</b>	16	148	30%	65%
<b>YEAR 2</b>				
<b>YEAR 3</b>				
<b>YEAR 4</b>				

# Plot 3 (Invaded) Monitoring Changes

<b>PLOT 3</b> (Netted Chain Fern)	<b># Plants</b>	<b># Stems</b>	<b>Fern Cover</b>	<b>Stiltgrass Cover</b>
<b>YEAR 1</b>	16	148	30%	65%
<b>YEAR 2</b>	22	271	40%	55%
<b>YEAR 3</b>				
<b>YEAR 4</b>				

# Plot 3 (Invaded) Monitoring Changes

<b>PLOT 3 (Netted Chain Fern)</b>	<b># Plants</b>	<b># Stems</b>	<b>Fern Cover</b>	<b>Stiltgrass Cover</b>
<b>YEAR 1</b>	16	148	30%	65%
<b>YEAR 2</b>	22	271	40%	55%
<b>YEAR 3</b>	Indeterminate	320	80%	25%
<b>YEAR 4</b>				

# Plot 3 (Invaded) Monitoring Changes

<b>PLOT 3</b> (Netted Chain Fern)	<b># Plants</b>	<b># Stems</b>	<b>Fern Cover</b>	<b>Stiltgrass Cover</b>
<b>YEAR 1</b>	16	148	30%	65%
<b>YEAR 2</b>	22	271	40%	55%
<b>YEAR 3</b>	Indeterminate	320	80%	25%
<b>YEAR 4</b>	Indeterminate	385	90%	1%



# Plot 1, Year 4 -- New York Fern





# Plot 2, Year 4 -- New York Fern





# Plot 3, Year 4 – Netted Chain Fern



SO...

Can intentionally planted native ferns inhibit or outcompete *Microstegium viminium* and serve as a possible biological control?



**YES!**



# Questions? - Contact Info...

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