

Overview of *Hydrilla verticillata* and Current Status in NYS



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NYS AIS(P) Frequency

- *Myriophyllum spicatum*- 340 waterbodies
- *Potamogeton crispus*- 171 waterbodies
- *Trapa natans*- 73 waterbodies
- *Myriophyllum heterophyllum*- 63 waterbodies
- *Cabomba caroliniana*- 39 waterbodies
- *Najas minor*- 32 waterbodies
- *Hydrilla verticillata*- 15 waterbodies
- *Hydrocharis morsus-ranae*- 15 waterbodies
- *Egeria densa*- 13 waterbodies
- Total number of infested waterbodies (as of 2013)
= >520



Hydrilla verticillata L.f. Royle



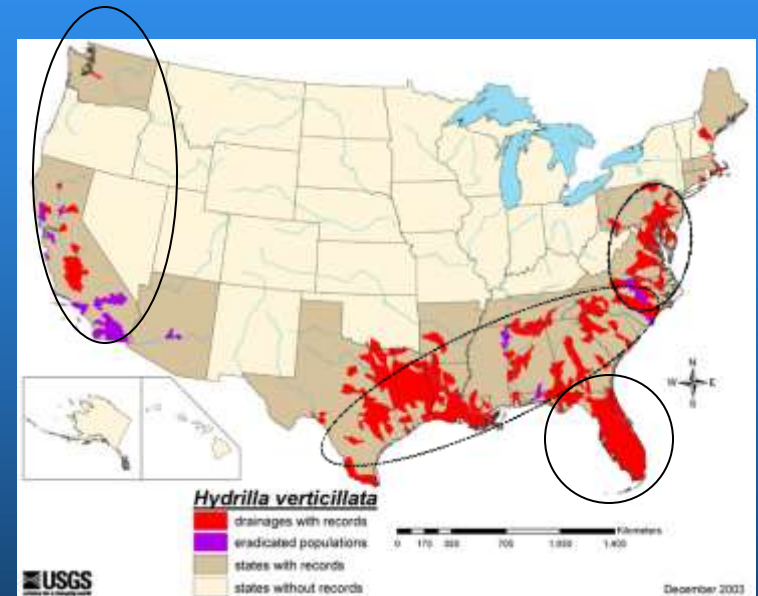
- Hydrilla- Hydrocharitaceae family
 - “Monocot” = one seed leaf; other distinctions from dicots (including adventitious roots)
 - Family includes Elodea, Egeria, and Vallisneria
- Native to tropical SE Asia
 - Found on 6 continents
 - Multiple Biotypes- organs or flowers of both sexes borne on a single plant (mono) or separate plants (di)
- **Dioecious** (India) and **monoecious** (Korea) biotypes
 - Separate introductions to the US
 - Worldwide – monoecious is tropical and dioecious is temperate (but not really in US....)



4 Distinct Waves of Invasion

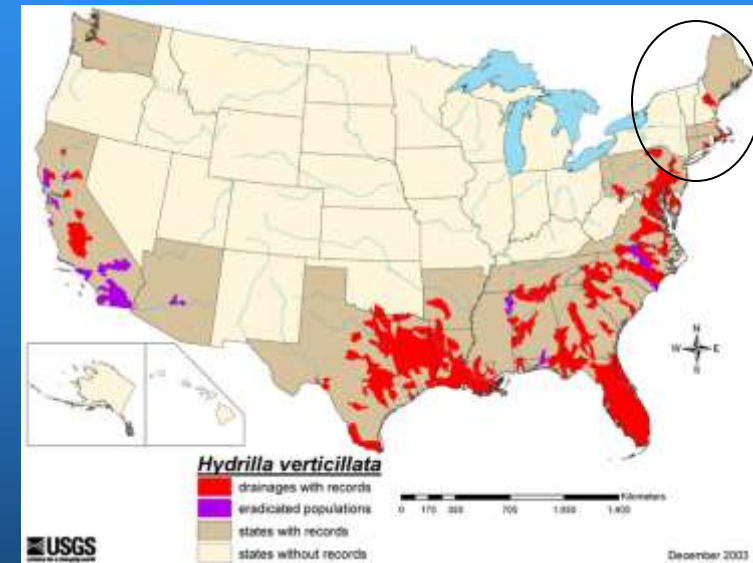
(Netherland, 2012)

- Florida invasion
 - Profound impacts on how people view hydrilla
- Southeast and Texas – Reservoir invasion
 - Very limited number of natural lakes
 - Grass carp option
- California and West Coast
 - Rapid response and eradication approach
- Mid-Atlantic States
 - Monoecious hydrilla (distinct biotype)



The 5th Wave ?

- Glacial Lakes of the NE and upper MW
 - 1000's of lakes with potential to support hydrilla
- State policies are mixed
 - Precautionary principle – we don't want to know how bad hydrilla can get (eradicate)
 - We don't know how bad hydrilla can get (wait & see)
- 5 to 10 years from now, what will we say? Is a regional approach needed?
 - We saw the early stages of a major new invasion
 - What was all the fuss about ?



Progression of Hydrilla Spread

Year	Number of States	States
1960 – 1969	1	FL (1953 ?)
1970 – 1979	6	AL, CA, DE, GA, LA
1980 – 1989	13	CT, MD, MS, NC, SC, TX, VA
1990 – 1999	17	AR, PA, TN, WA
2000 – 2011	29	ID, IN, KY, MA, ME, NJ, OK, WI, WV, NY, KS, OH



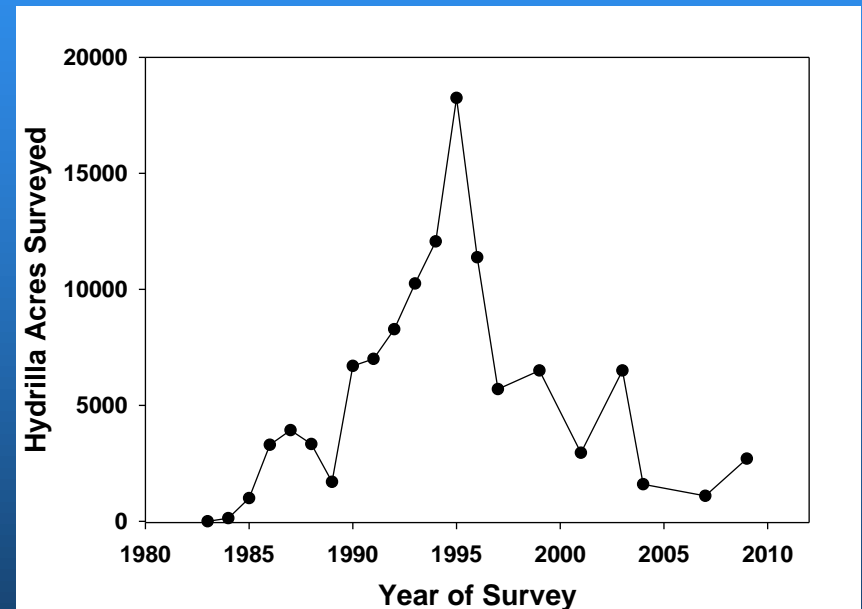
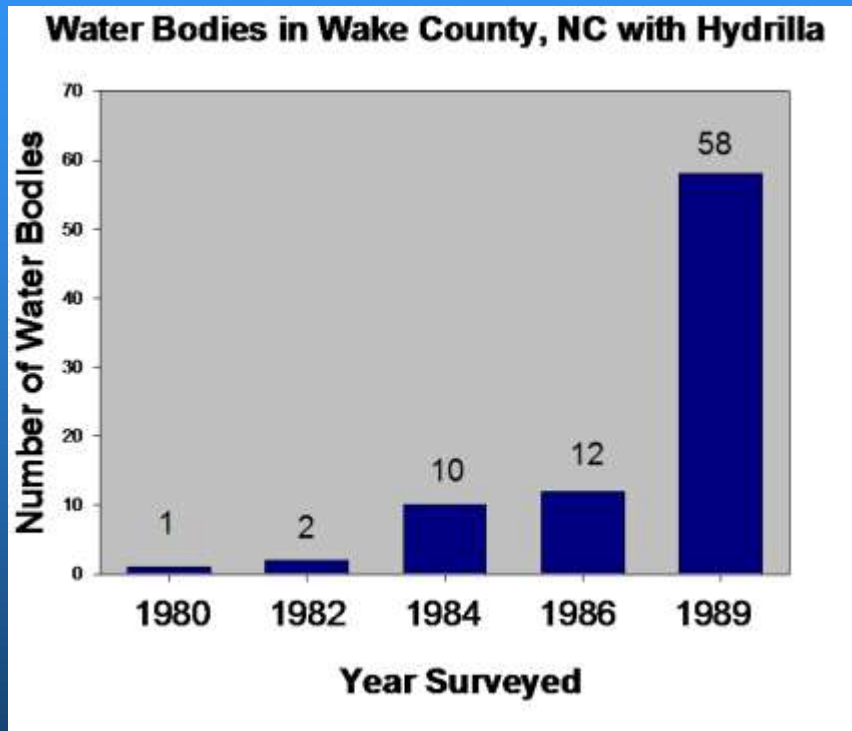
Spread of Monoecious Hydrilla

Year	Number of States	States
1970 – 1979	1	DE
1980 – 1989	6	CA, (CT ?), MD, NC, VA
1990 – 1999	8	PA, WA
2000 – 2011	21	IN, KY, MA, ME, NJ, WI, WV, NY, OH, (KS ?) SC, TN, GA, AL



So what's the big deal?

Lake Kissimmee (FL)



...and wait till you see what happened in Long Island..



Challenges in hydrilla management everywhere....

- Very aggressive, luxurious plant
- Overwhelms many ecosystems
- Produces novel toxin, implicated in bald eagle deaths in South Carolina
- Multiple means for reproduction
- Multiple means for spread
- Persistence of tubers- need to stay at “eradication” for > 5-10 years
- Very few control options
- Few rapid response frameworks available



Challenges in hydrilla management in New York



- Big state, many waters, many invaders
- Biotypes
- Bottom of the learning curve
- Eradication in flowing water and ponded water systems
- “Lack”
- Regulatory hurdles



Dioecious Hydrilla

- Where it grows?
 - Mostly southern US
- How it grows?
 - Up then out (dense surface canopy)
 - Longer leaves/bigger tubers
 - GODZILLA?
- When it grows?
 - Tubers -when day length < 12 hr (asynchronous tuber sprouting?)
 - Plants- perennial
- What about those tubers?
 - White, longer, fewer produced
- Herbicide resistance?
 - Yes (Florida only for now)



Monoecious Hydrilla

- Where it grows?
 - Mostly northern US
- How it grows?
 - Out then up (dense bottom cover)
 - Shorter leaves/smaller tubers
 - Godzilla's WIMPY COUSIN?
- When it grows?
 - Tubers -when day length < 12 hr (asynchronous tuber sprouting?)
 - Plants- annual
- What about those tubers?
 - Brownish, shorter, copious production
- Herbicide resistance?
 - No



Cracking the code of the tuber



- Need to “penetrate” tuber to control over long-term
- Susceptibility of the tubers to freezing?
- Viability of tubers in dredged material?
- Environmental factors that influence sprouting and the timing of tuber sprouting in the North
- Exploration of methods to “trigger sprouting”



Manipulation of hydrilla tuber sprouting remains the “holy grail” of management



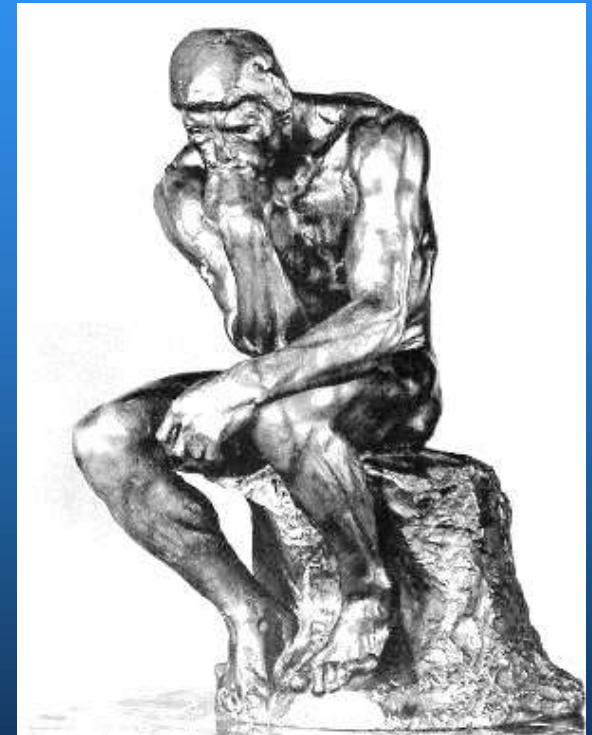
Unknowns for Hydrilla in NY

- What is the greatest environmental constraint to hydrilla growth in NE waters ?
 - Seasonal Extremes (temp, flow, etc.) ?
 - Sediment Composition, Water Quality,....?
 - Remember – Variable Milfoil and Cabomba are southern imports thriving in New England and NY
- Can hydrilla colonize and dominate in deep NY Lakes ?
- How well will monoecious hydrilla do in flowing systems?
- Will monoecious hydrilla be competitive ?



Bottom of the learning curve: Monoecious Hydrilla

- Search of the UF Center for Aquatic and Invasive Plant Library
 - “Hydrilla” = 5099 records
 - “Monoecious Hydrilla” = 197 records
 - > 80 % are titles from Presentations
- Bottom Line
 - Very few published articles focusing on the monoecious biotype in US



Challenges in “Lacks”

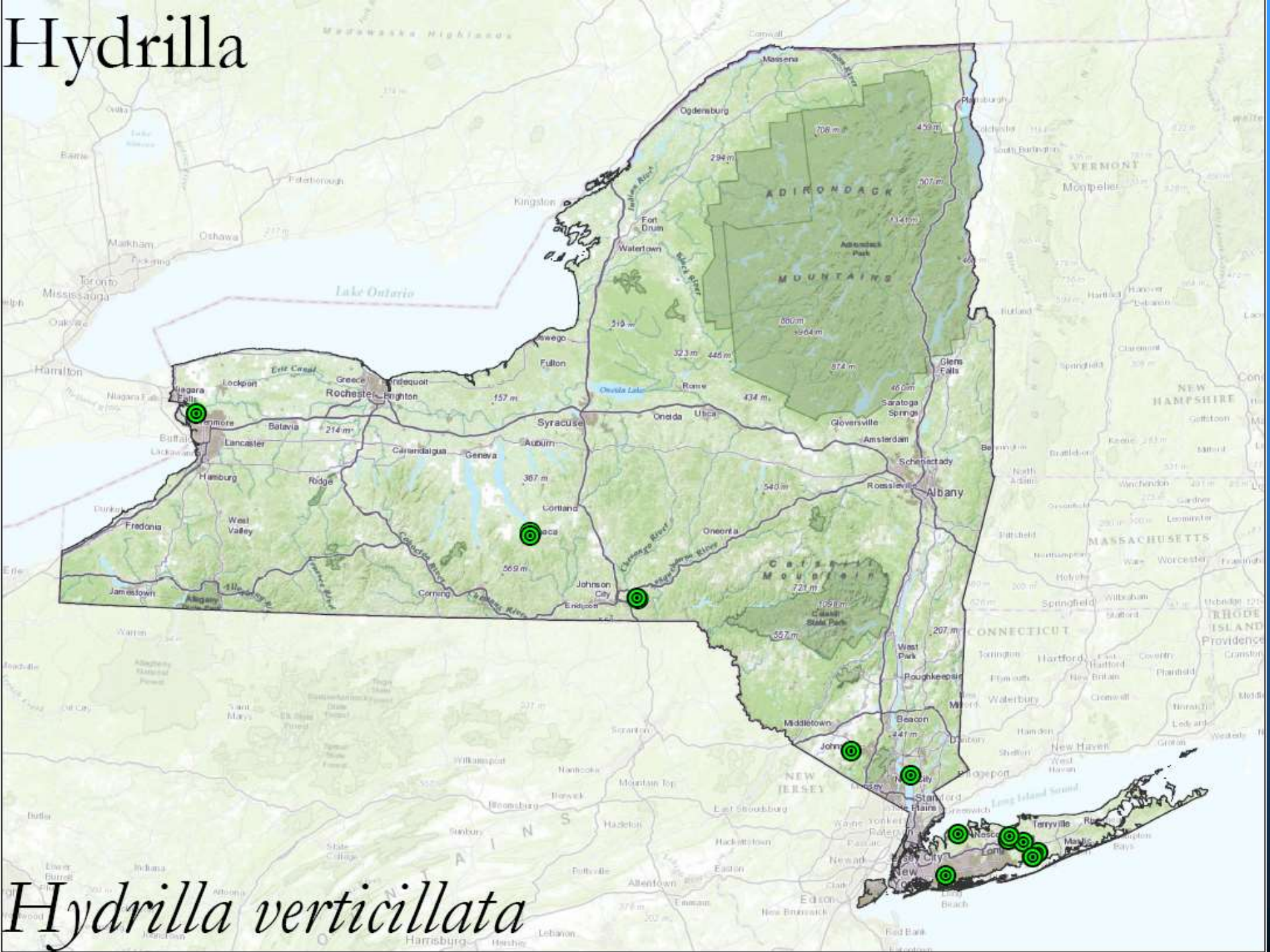
- Lack of local “ownership”
 - PRISMs not fully established or AIS-plant centric in all regions
 - No plant managers in most DEC regions (different focus)
 - Multiple towns/counties for some infestations
- Lack of money
 - Treatment costs given heavy expenditures/limited funds in other areas
- Lack of tools
 - Few management tools available
- Lack of statutory authority
 - ..to declare SEQR emergency (except...)
 - ..to close access/quarantine



UGA2122081



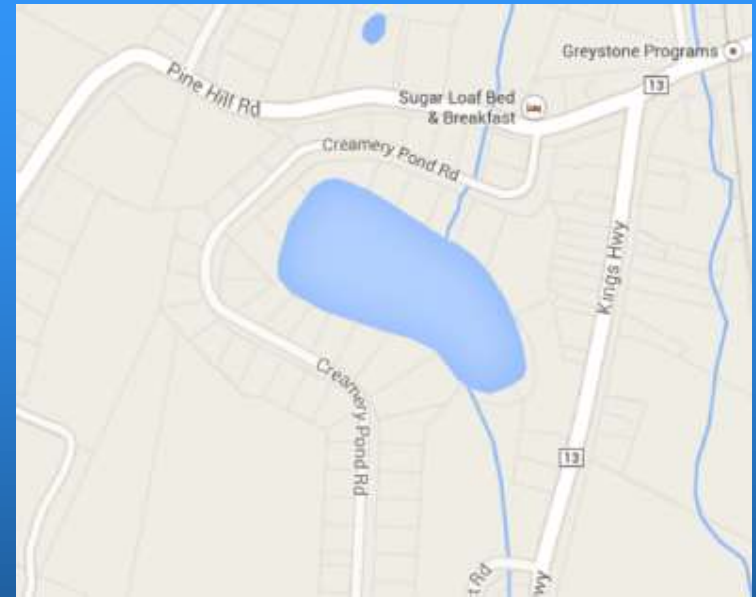
Hydrilla

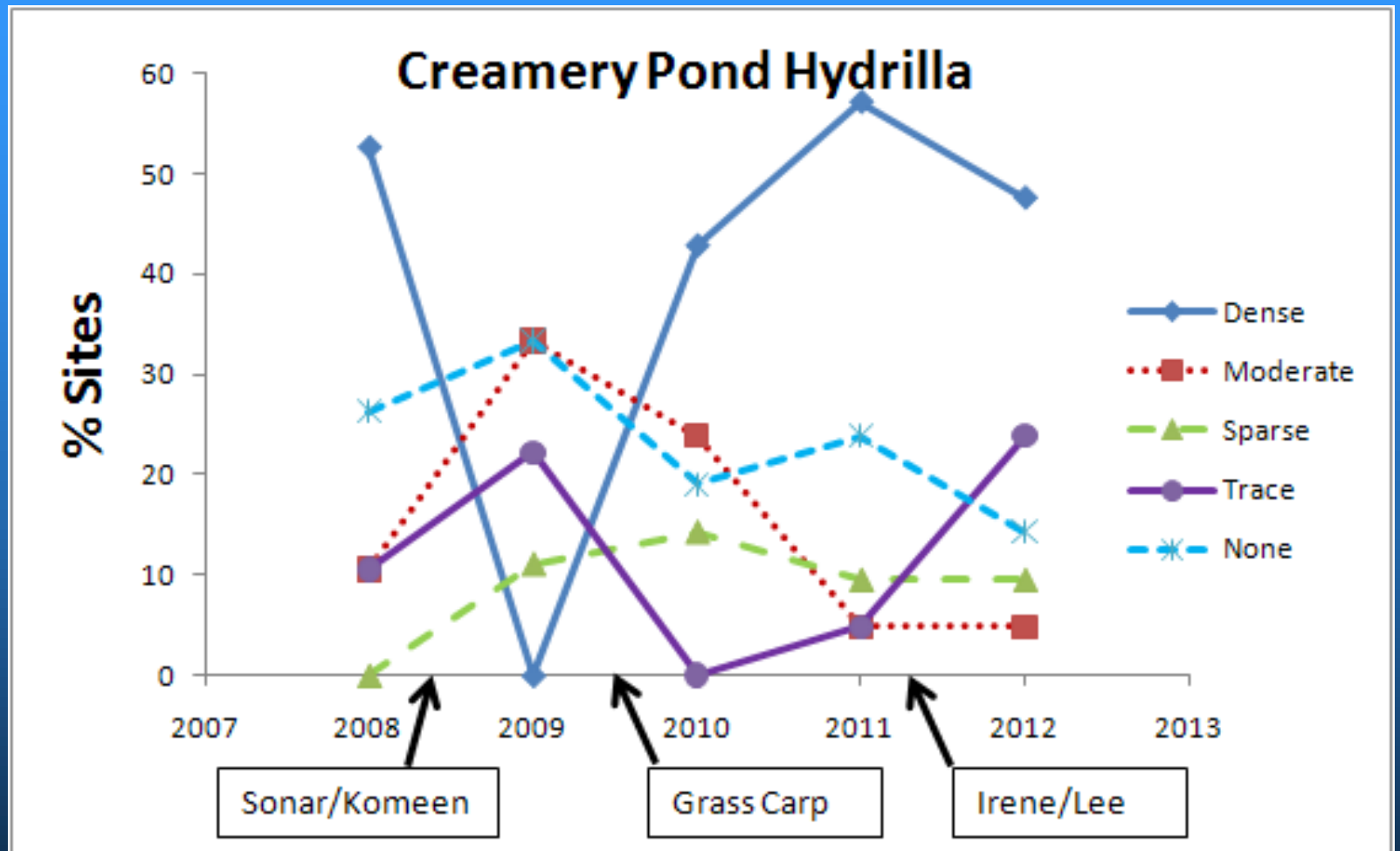


Hydrilla verticillata

Sugar Loaf NY (Orange County)

Waterbody Name	Creamery Pond
Size	9 acres
Public access?	none
Year of discovery	2008
Discovered by	Public report
Introduced by	Aquaria?
Next closest hydrilla site	60 miles (Wilton CT)
Access next closest site	none
Extent Infestation	Moderate to dense throughout lake
Management Action(s)	Fluridone/Komeen, Grass carp
Duration Management	On-going
Population 2013	Biomass initially reduced 60-80%, now increasing





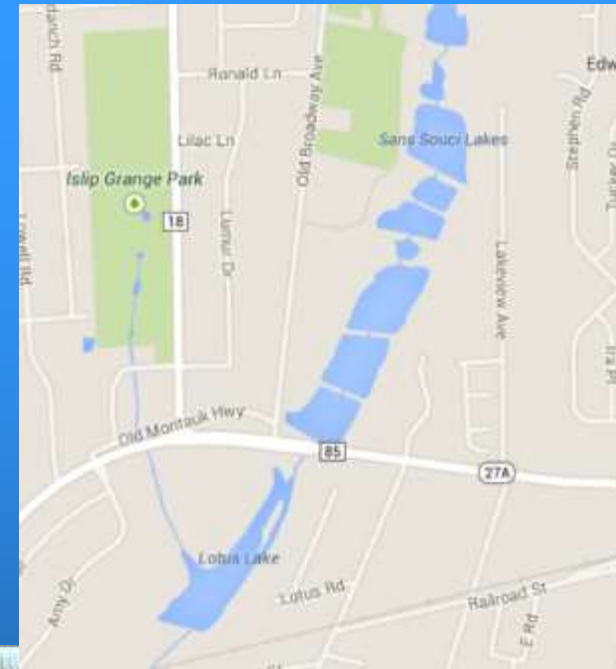
The Long Island Cluster

- 2008 Discoveries- DEC DOW Albany
 - Sans Souci Pond (32 ac)- county park; no public or private access
 - Lotus Lake (13 ac)- no public and only non-power private access
- 2009 Discoveries- DEC DOW Albany , DEC DFW R1, public
 - Lake Ronkonkoma (240 ac)- public boat launch, limited private
 - New Mill Pond (110 ac)- county park- county rowboat access only
 - Phillips Mill Pond (8 ac)- state park- no public or private access
 - Frost Mill Pond (<1 ac)- private pond- no access
- 2011 Discoveries- DEC DFW R1
 - Smith Pond (7 ac)- town park- no public or private access
 - Great Patchoque Lake (12 ac)- public hand launch
- 2012 Surveys
 - Not found in any ponds neighboring known infestations
- 2013 Discoveries- private (Envr. Consultant)
 - Millers Pond- (21 ac)- shoreline fishing access- no boats



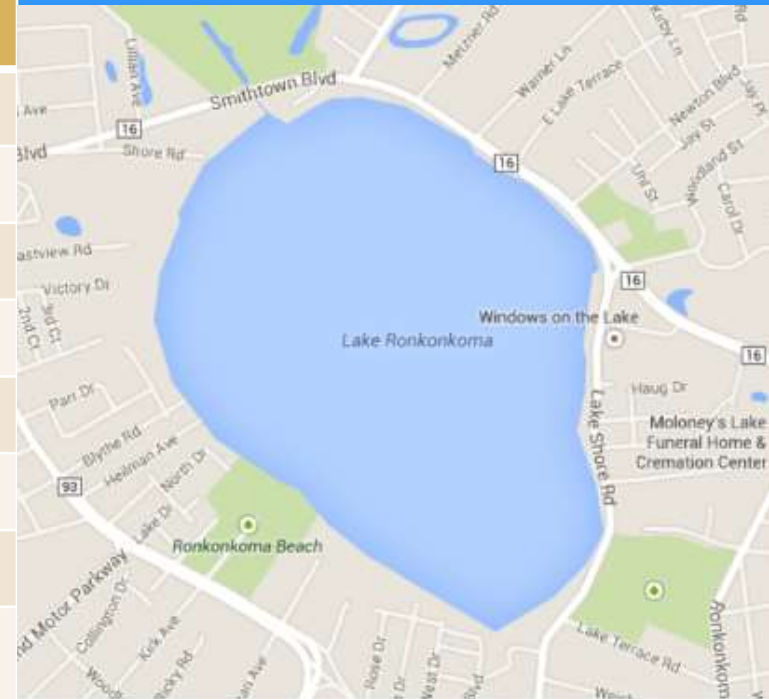
Sayville NY

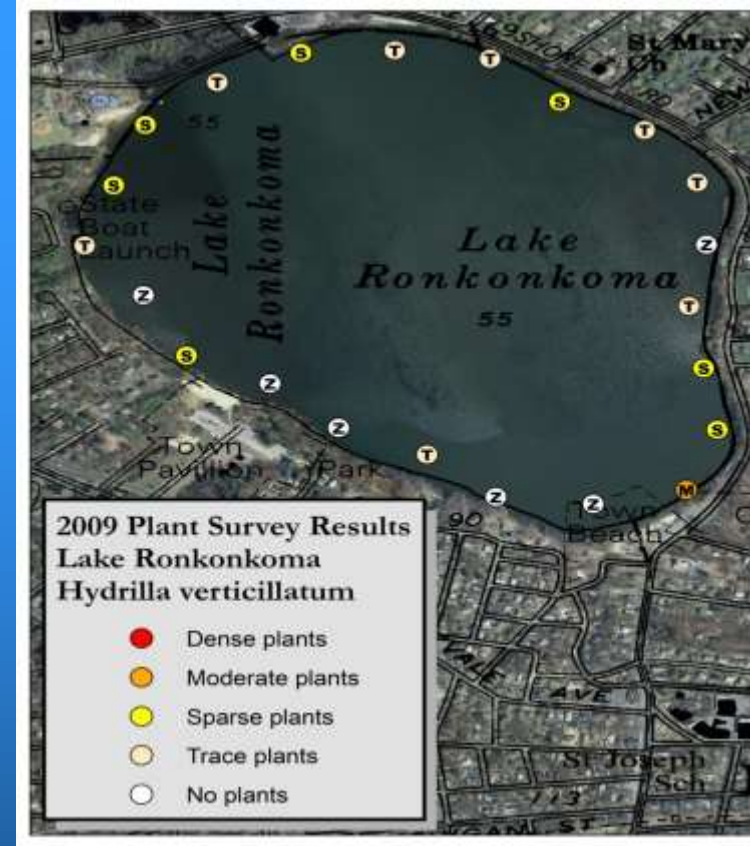
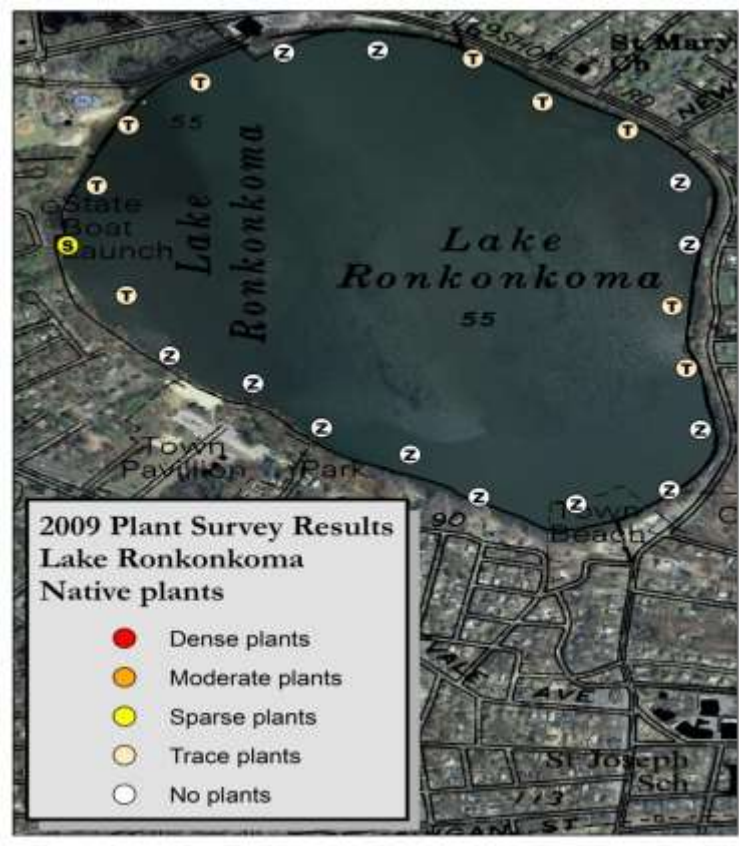
Waterbody Name	Sans Souci-Lotus Lakes
Size	32 / 13 acres
Public access?	None (county park)
Year of discovery	2008
Discovered by	NYSDEC routine survey
Introduced by	Waterfowl?
Next closest hydrilla site	50-90 miles (Wilton CT)
Access next closest site	none
Extent Infestation	Sans Souci-moderate in downstream 5 acres Lotus- dense throughout
Management Action(s)	none
Duration Management	none
Population 2013	Unknown- scheduled for 2014 survey



Ronkonkoma NY

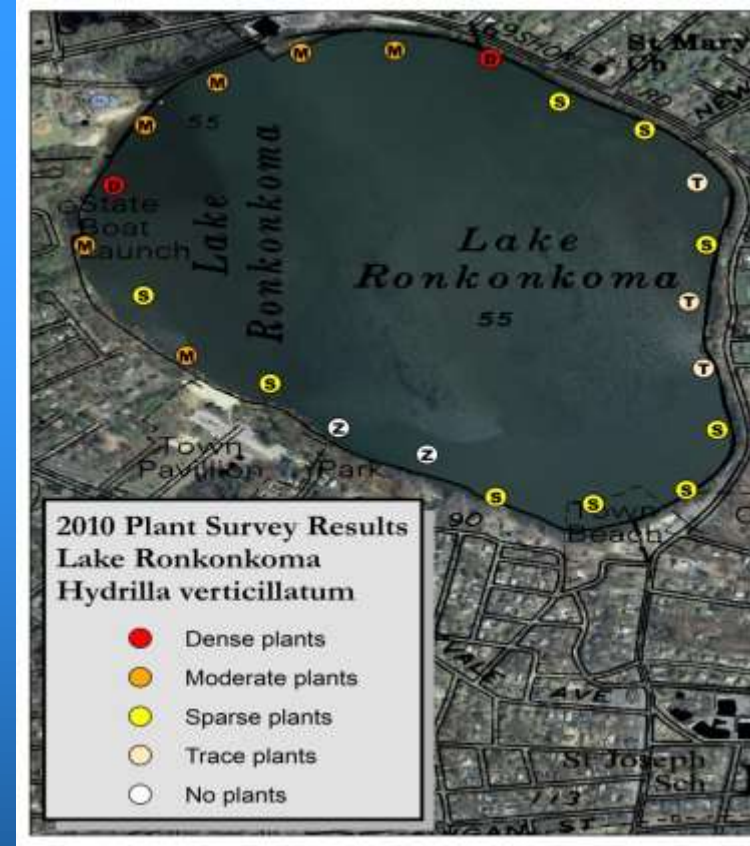
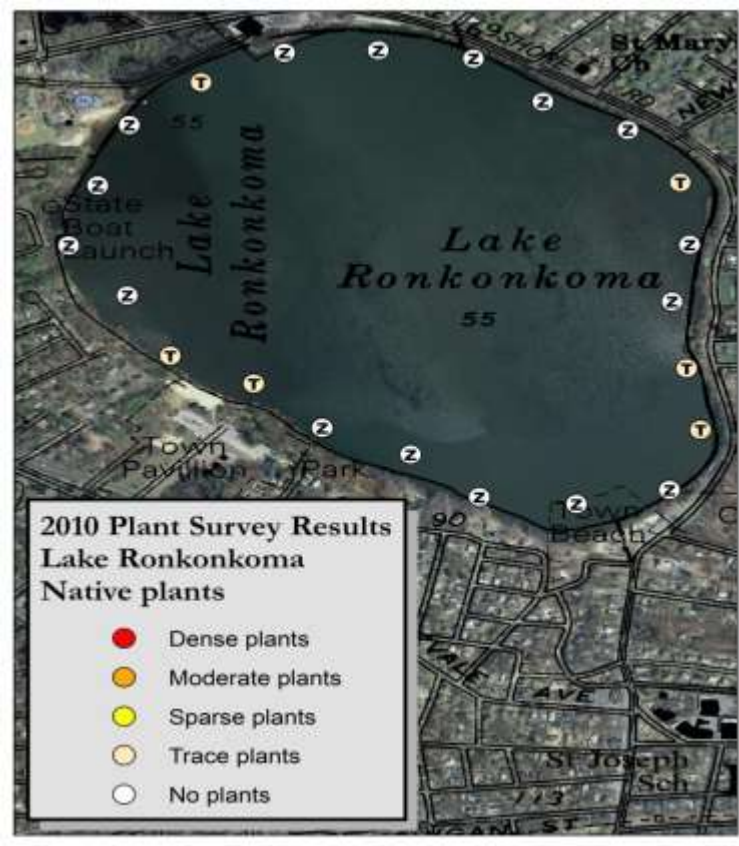
Waterbody Name	Lake Ronkonkoma
Size	240 acres
Public access?	Public boat launch
Year of discovery	2009
Discovered by	NYSDEC routine survey
Introduced by	?
Next closest hydrilla site	5 miles (Sayville NY)
Access next closest site	none
Extent Infestation	Sparse to moderate in 5-10 acres; 70% of littoral zone
Management Action(s)	Grass carp stocking planned
Duration Management	?
Population 2013	Sparse to dense in 90% littoral zone





- 2007 plant surveys by DEC DOW- essentially no plants found
- 2009 plant surveys conducted by DEC Region 1 Fish and Wildlife staff indicated that few aquatic plants are found in lake
- Hydrilla was limited to trace or sparse growth in a few locations along the shoreline



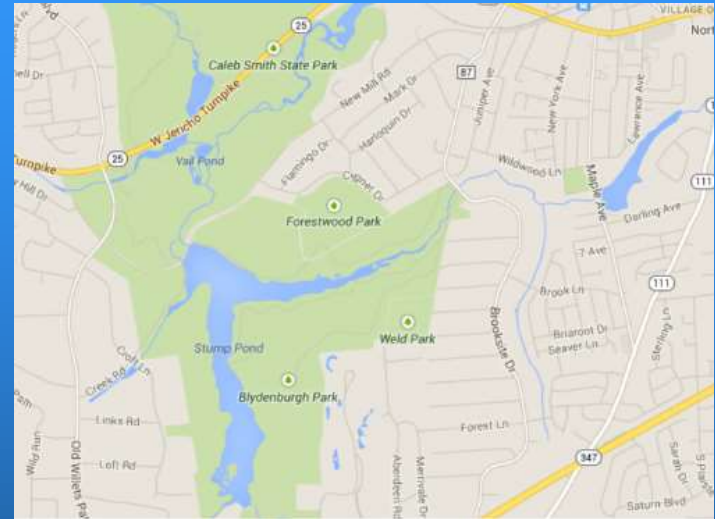


- By 2010, hydrilla expanded significantly from 2009, particularly along the northern and western shoreline near the boat launch (> 3 acres of plants growing to lake surface)
- Hydrilla found in appx. 90% of the littoral zone, to depth of 12 feet, occupies 10-15% of lake area)
- May provide important habitat not otherwise available



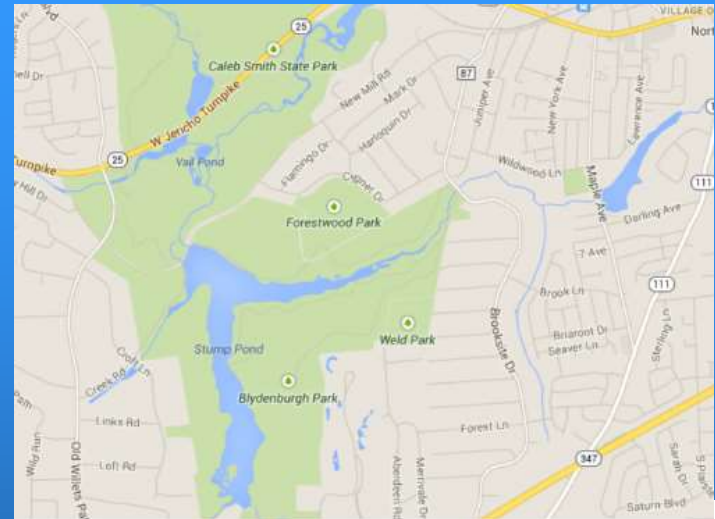
Smithtown NY

Waterbody Name	New Mill Pond aka Stump Pond
Size	110 acres
Public access?	County rowboat launch
Year of discovery	2009
Discovered by	TNC/NYSDEC R1 annual shoreline surveys
Introduced by	?
Next closest hydrilla site	5 miles (Sayville NY)
Access next closest site	none
Extent Infestation	Found at 26 of 27 sampling sites in 2012 and 2013
Management Action(s)	None; Grass carp stocking proposed
Duration Management	None
Population 2013	Dense throughout lake



Smithtown NY

Waterbody Name	Phillips Mill Pond
Size	8 acres
Public access?	none- Caleb Smith SP
Year of discovery	2009
Discovered by	NYSDEC R1 shoreline survey
Introduced by	Waterfowl?
Next closest hydrilla site	<5 miles (Sayville NY)
Access next closest site	none
Extent Infestation	Dense at shoreline
Management Action(s)	None; Grass carp stocking proposed
Duration Management	None
Population 2013	Not known- 2012-verified



Mill Neck NY

Waterbody Name	Frost Mill Pond
Size	< 1 acre
Public access?	none
Year of discovery	2009
Discovered by	Pond owner after press reports for LI hydrilla
Introduced by	Intentional (accidental) planting
Next closest hydrilla site	35 miles (Sayville NY)
Access next closest site	none
Extent Infestation	Not surveyed
Management Action(s)	Hand removal, 4 grass carp
Duration Management	On-going
Population 2013	None observed in lake as of 2011



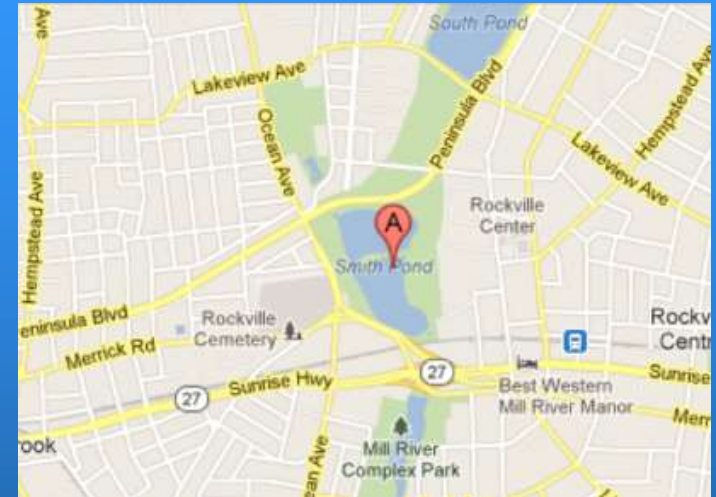
How it (sometimes) gets there....

- Report of Lake Ronkonkoma finding led to call from local resident reporting that she purposefully introduced hydrilla into her pond (in Mill Neck) on advice of local aquaria shop to “oxygenate” the water
- *Anacharis* is common aquaria plant often mistaken for Brazilian elodea (*Egeria densa*) or hydrilla- plant in question may have been labeled as *Anacharis*
- Easily purchased in store or on-line



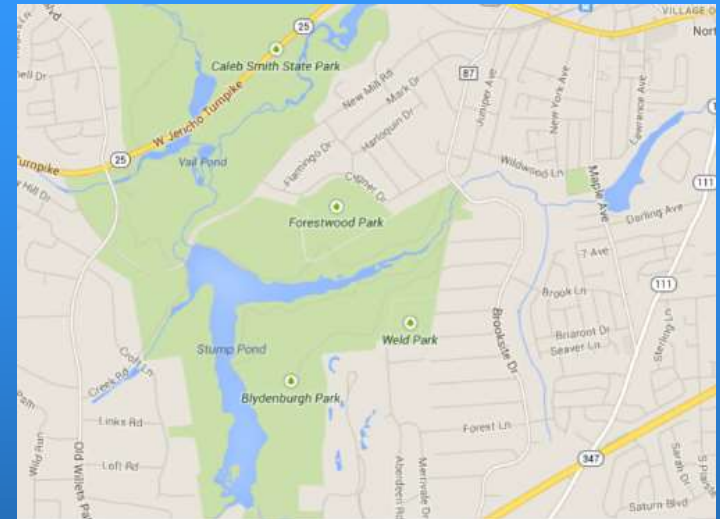
Rockville Center NY

Waterbody Name	Smith Pond
Size	7 acres
Public access?	None- Morgan Days town park
Year of discovery	2011
Discovered by	NYSDEC R1 shoreline survey
Introduced by	Waterfowl?
Next closest hydrilla site	30 miles (Sayville NY)
Access next closest site	none
Extent Infestation	Not yet surveyed- very dense spatterdock
Management Action(s)	None yet
Duration Management	None
Population 2013	Unknown; 2009- not found in lake



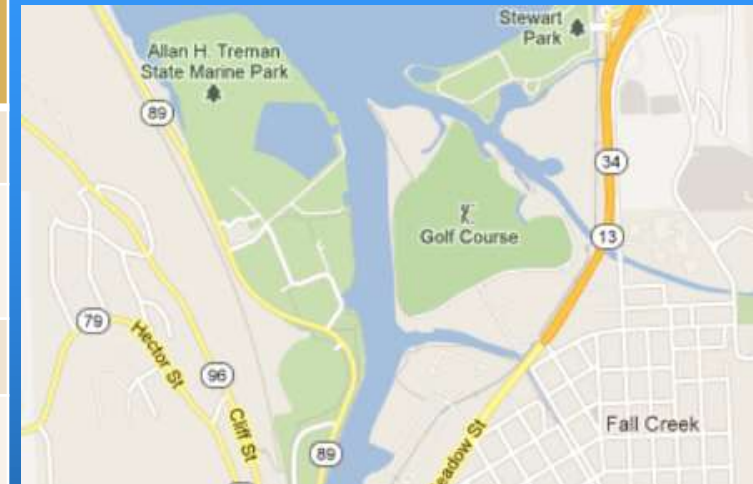
Smithtown NY

Waterbody Name	Millers Pond
Size	21 acres
Public access?	None- shoreline fishing /waterfowl feeding
Year of discovery	2013
Discovered by	Informal survey by envr. consultant
Introduced by	Waterfowl?
Next closest hydrilla site	< 2 miles (same town)
Access next closest site	County rowboat launch
Extent Infestation	Not yet fully surveyed- mix of native plants
Management Action(s)	None yet
Duration Management	None
Population 2013	Sparse to moderate



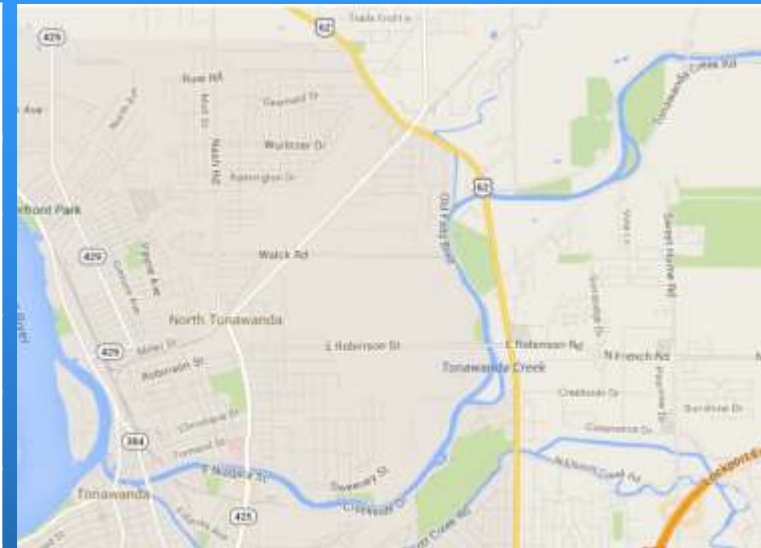
Ithaca NY

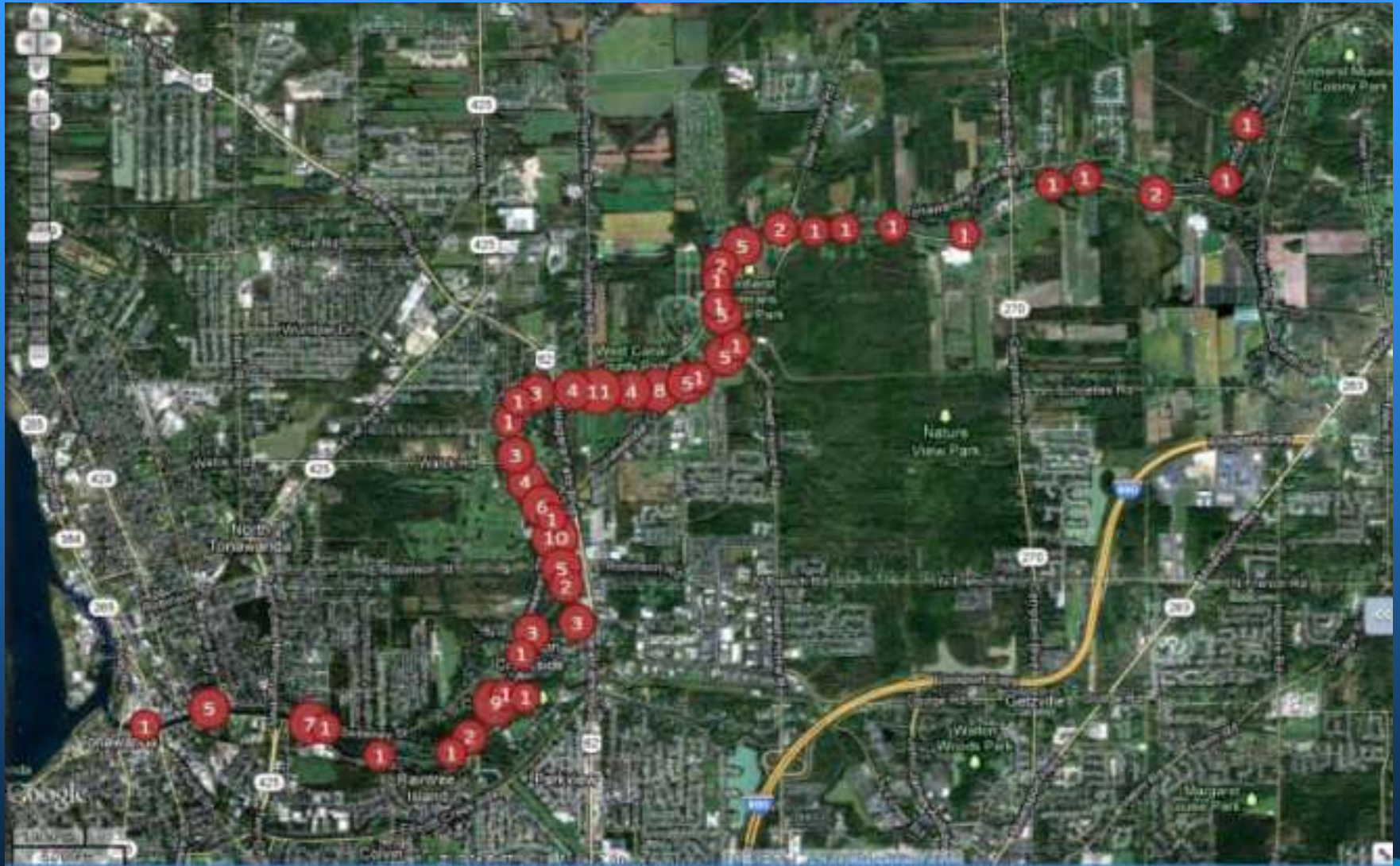
Waterbody Name	Cayuga Inlet (incl nearby inlets and SE lake)
Size	Appx 175 acres
Public access?	Multiple- state launch and private marinas
Year of discovery	2011
Discovered by	Cayuga Lake Floating Classroom
Introduced by	?
Next closest hydrilla site	50 miles (Warren PA)
Access next closest site	none
Extent Infestation	Sparse to dense
Management Action(s)	Endothal, Fluridone, DASH
Duration Management	On-going
Population 2013	>95% eradication plants and tubers



Tonawanda NY

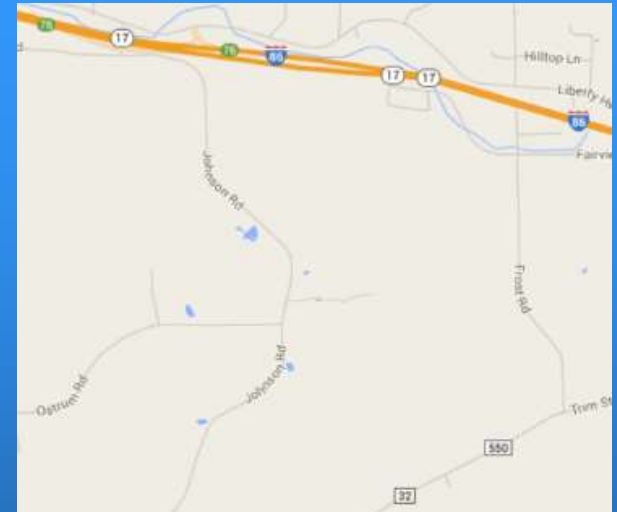
Waterbody Name	Erie Canal/ Tonawanda Creek
Size	Appx 360 acres
Public access?	Multiple- state launches
Year of discovery	2012
Discovered by	USFWS
Introduced by	?
Next closest hydrilla site	125 miles (Ithaca, NE Ohio)
Access next closest site	Not known
Extent Infestation	Sparse to dense
Management Action(s)	Likely Endothall
Duration Management	On-going?
Population 2013	Sparse to dense





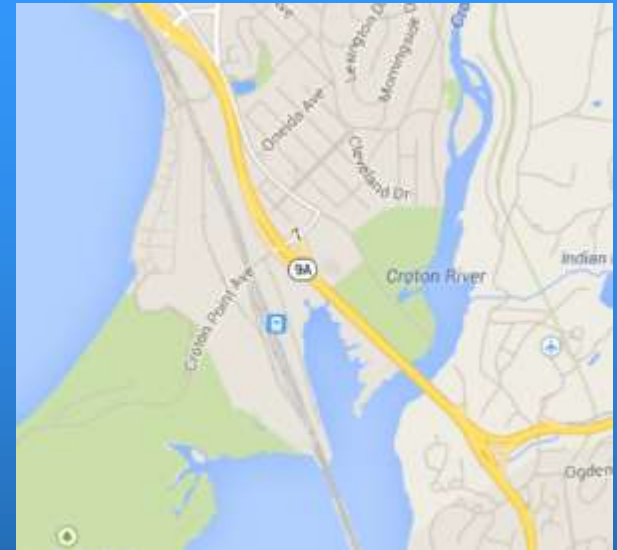
New Windsor NY

Waterbody Name	Unnamed Ponds
Size	< 5 acres
Public access?	None- private
Year of discovery	2012
Discovered by	Allied Biological
Introduced by	?
Next closest hydrilla site	60 miles (Ithaca)
Access next closest site	Multiple launches
Extent Infestation	Not known
Management Action(s)	Not known
Duration Management	None
Population 2013	Not known



Croton on Hudson NY

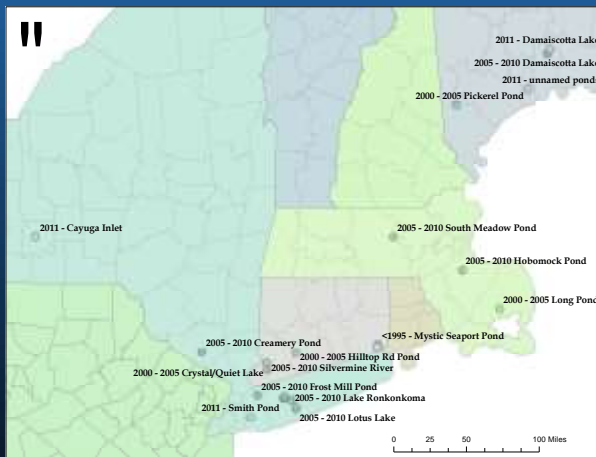
Waterbody Name	Croton River
Size	Not known
Public access?	None- private
Year of discovery	2013
Discovered by	David Werier
Introduced by	?
Next closest hydrilla site	25 miles (Chester NY)
Access next closest site	None
Extent Infestation	Not known
Management Action(s)	Not known
Duration Management	None
Population 2013	Not known



Why hast thou smote me? (Why here?)



- Nearly all 30+ infested sites throughout the northeastern US are isolated from each other
- Some sites with public access and heavy boat traffic
- Other sites private with no access or significant usage
- NO CLEAR REASON WHY ANY INFESTED SITE WAS “CHOSEN”
- Invasives don't spontaneously generate or just “show up”- they must be introduced
- This is only common factor among all infested lakes



Why hydrilla? Turning back the clock to the 1940s

- Knowledge/concerns about invasive species in its infancy
- Eurasian watermilfoil first found in the Finger Lakes region in 1940s
- Eradication only conceivable with use of obsolete pesticides (including arsenic based chemicals) or dredging
- Present eradication tools not developed until early 1960s
- By then, Eurasian watermilfoil had escaped from the Finger Lakes
- Now found everywhere in NYS and dominates many lake communities
- Where will hydrilla be in 2080?

