

If at first you don't succeed ...



... *cry, cry*, again???

(How to stop invasive aquatic plants
in New England)

Don Les
University of Connecticut
Dept. of Ecology & Evolutionary Biology



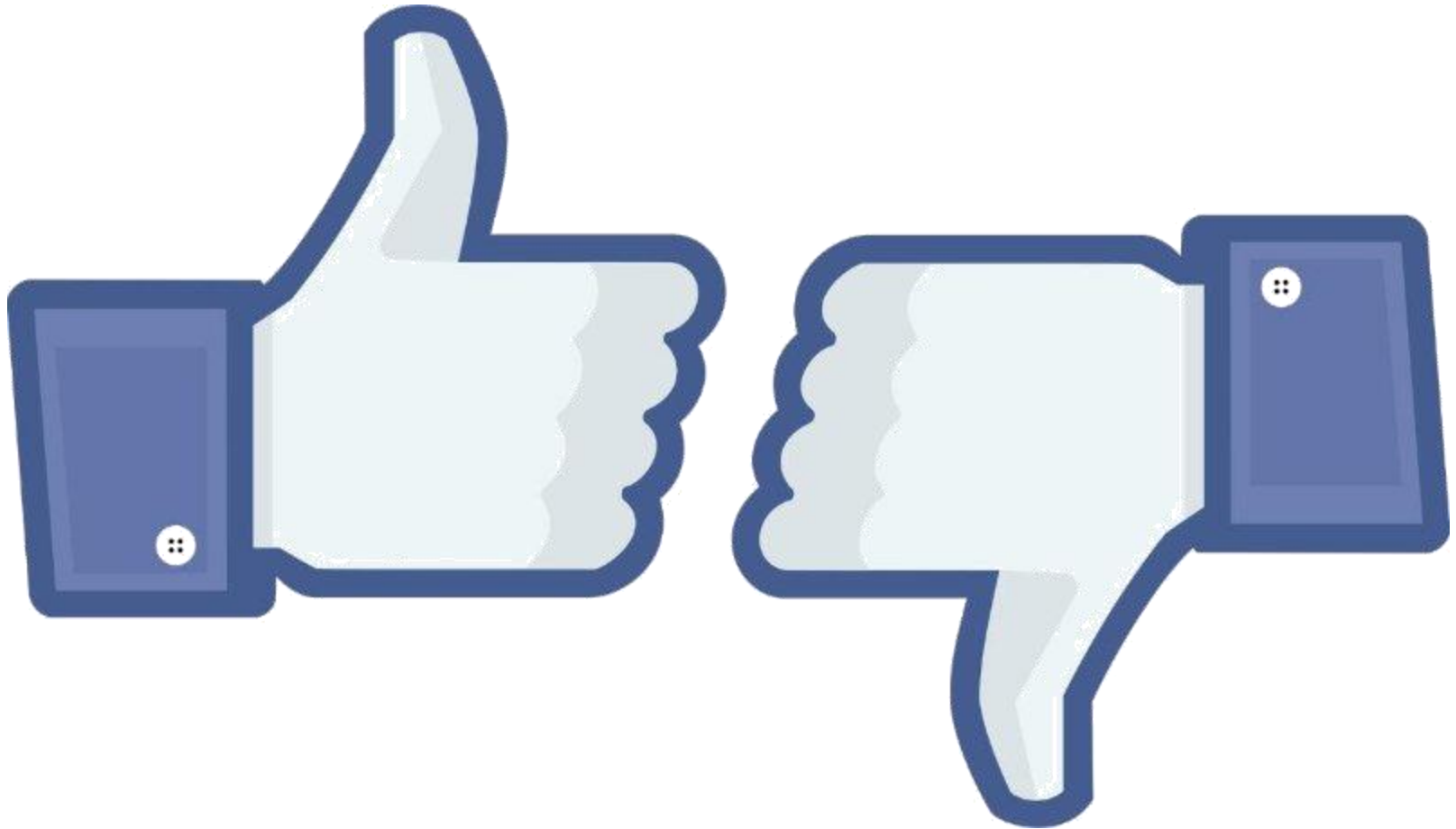
Aquatic Plant Management

a. What is aquatic plant management?

1. **management (general definition)**: the judicious use of means to accomplish an end; the act of directing; guidance; control
 - a. judicious: proceeding from good sense or judgment
 - b. end: the state of affairs that a plan is intended to achieve
2. **aquatic plant management (to the public)**: The use of a *planned strategy* for *controlling the growth* of aquatic plants, to *provide a beneficial product or service* for people.
 - can involve indigenous or nonindigenous species
3. **aquatic plant management (to biologists)**: To reduce or eliminate the adverse ecological impacts of invasive aquatic plant species on natural communities.
 - involves only nonindigenous species

In the purest sense, the ultimate management goal is to completely eliminate invasive species (or at least to achieve permanent control to maintain sub-nuisance levels).

SO..... How are we doing?



The number of invasive aquatic plant species in the northeastern United States has increased progressively during the past 150 years (Les, 2002).

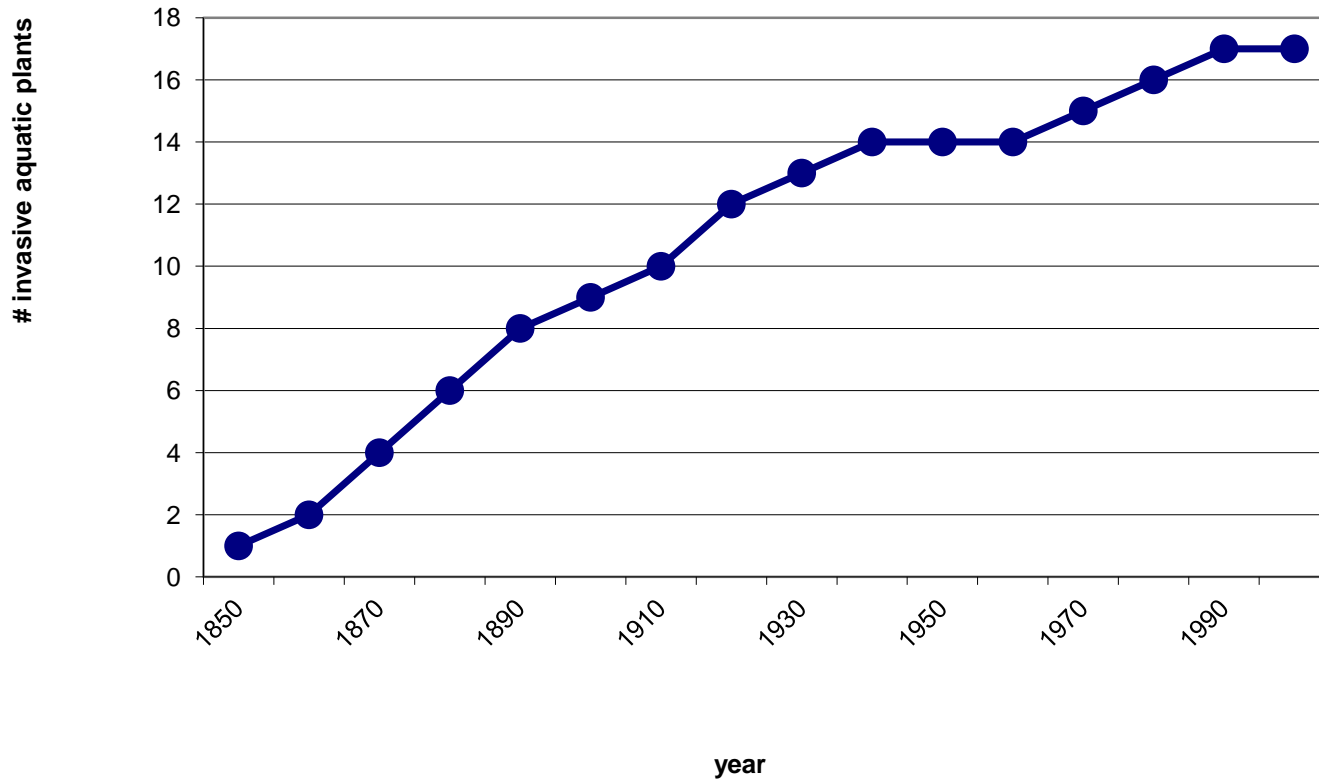


Table 1. Major nonindigenous aquatic plants in southern New England. Within categories, species are listed chronologically by their earliest reliable record for North America ('earliest NA'). Dates for the earliest reliable record in southern New England ('earliest SNE') and the most recent collection in southern New England ('recent SNE') are provided (see Appendix I). References are footnoted. 'Recent SNE' dates were obtained from specimens collected by the authors or available in New England herbaria.

List of species	Earliest NA	Earliest SNE	Recent SNE
Category I: Probably native but known only from recent historical records			
<i>Najas guadalupensis</i>	Native	Native? (1904, Nantucket I.) ^a	1998
Category II: Native to North America but nonindigenous in New England			
<i>Cabomba caroliniana</i>	Native	1920 (Hatfield, MA) ^b	1998
<i>Myriophyllum heterophyllum</i>	Native	1932 (Bridgeport, CT) ^c	1998
<i>Limnium spongia</i>	Native	1998 (Mansfield, CT) ^d	1998
Category III: Nonindigenous to North America			
<i>Acorus calamus</i>	<1762*	<1893*	1998
<i>Nasturtium officinale</i>	<1826 ^{e,*}	1831 (New Haven, CT) ^f	1998
<i>Potamogeton crispus</i>	1859 (Wilmington, DE) ^g	1880 (Middlesex Co., MA) ^g	1998
<i>Marsilea quadrifolia</i>	1860 (Bantam Lake, CT) ^h	1860 (Bantam Lake, CT) ^h	1998
<i>Callitriche stagnalis</i>	1861 (New York) ⁱ	1911 (Barnstable Co., MA) ⁱ	1998
<i>Veronica beccabunga</i>	1876 (Hudson Co., NJ) ^j	1879 (King's Co., NY) ^j	1998
<i>Trapa natans</i>	<1879 (Middlesex Co., MA) ^k	<1879 (Middlesex Co., MA) ^k	1998
<i>Nymphaeodes peltata</i>	1882 (Winchester, MA) ^l	1882 (Winchester, MA) ^l	1961
<i>Egeria densa</i>	1893 (Long Island, NY) ^m	1893 (Long Island, NY) ^m	1998
<i>Myriophyllum aquaticum</i>	1890 (Haddonfield, NJ) ⁿ	1929 (SE New York) ⁿ	1996
<i>Butomus umbellatus</i>	1905 (St. Lawrence R., QUE) ^o	1943 (New Haven, CT) ^p	1994
<i>Najas minor</i>	1934 (Hudson R., NY) ^q	1974 (Berkshire Co., MA) ^r	1998
<i>Myriophyllum spicatum</i>	1942 (Washington, DC) ^s	1971 (Berkshire Co., MA) ^t	1998
<i>Hydrilla verticillata</i>	1960 (E. Florida) ^u	1989 (Mystic, CT) ^v	1998

^aBicknell 1908; ^bManning 1937; ^cspecimen (CONN); ^dspecimen (CONN); ^eTorrey 1826; ^fIves et al. 1831; ^gStuckey 1979; ^hGray 1860; ⁱPhilbrick et al. 1998; ^jLes and Stuckey 1985; ^kDavenport 1879; ^lStuckey 1973; ^mWeatherby 1932; ⁿCouch and Nelson 1985b; ^oKnowlton 1923; ^pCountryman 1970; ^qClausen 1936; ^rWeatherbee 1996; ^sCouch and Nelson 1985a; ^tspecimen (NASC); ^uBlackburn et al. 1969; ^vLes et al. 1997; *uncertain (see text).

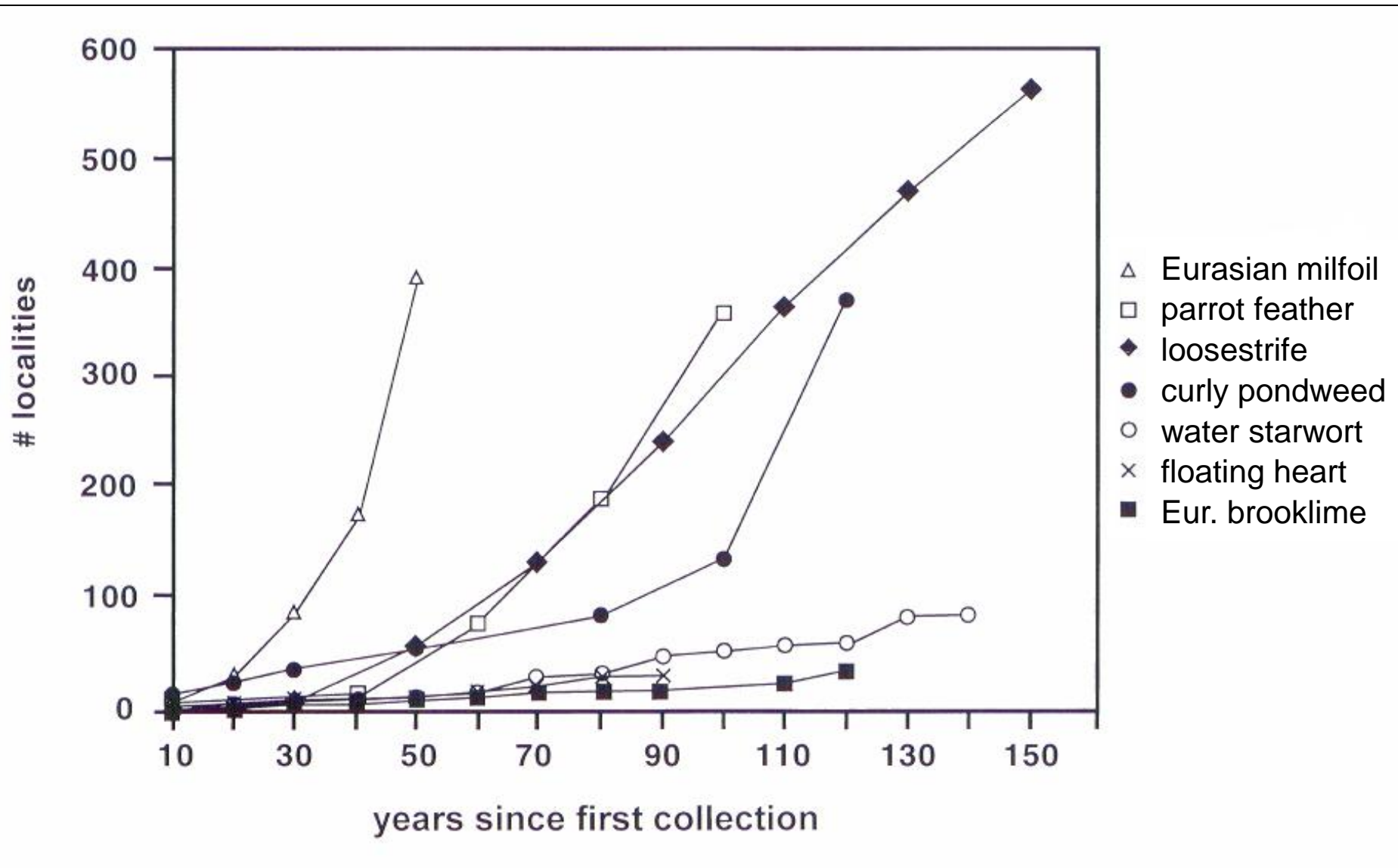


Figure 2. Collection curves for seven nonindigenous aquatic plants in southern New England. Curves were produced by plotting the number of specimen collections made in 10-year intervals relative to the time of first observance. Species characterized by steeply rising collection curves correlate with those species that are most often the focus of aquatic plant control programs; whereas, those with flatter collection curves are rarely reported as nuisance species (see text).

(from Les & Mehrhoff, 1999)

Problem aquatic plants in the USA

(from *Aquatics* 20(4):15-18; 1998)

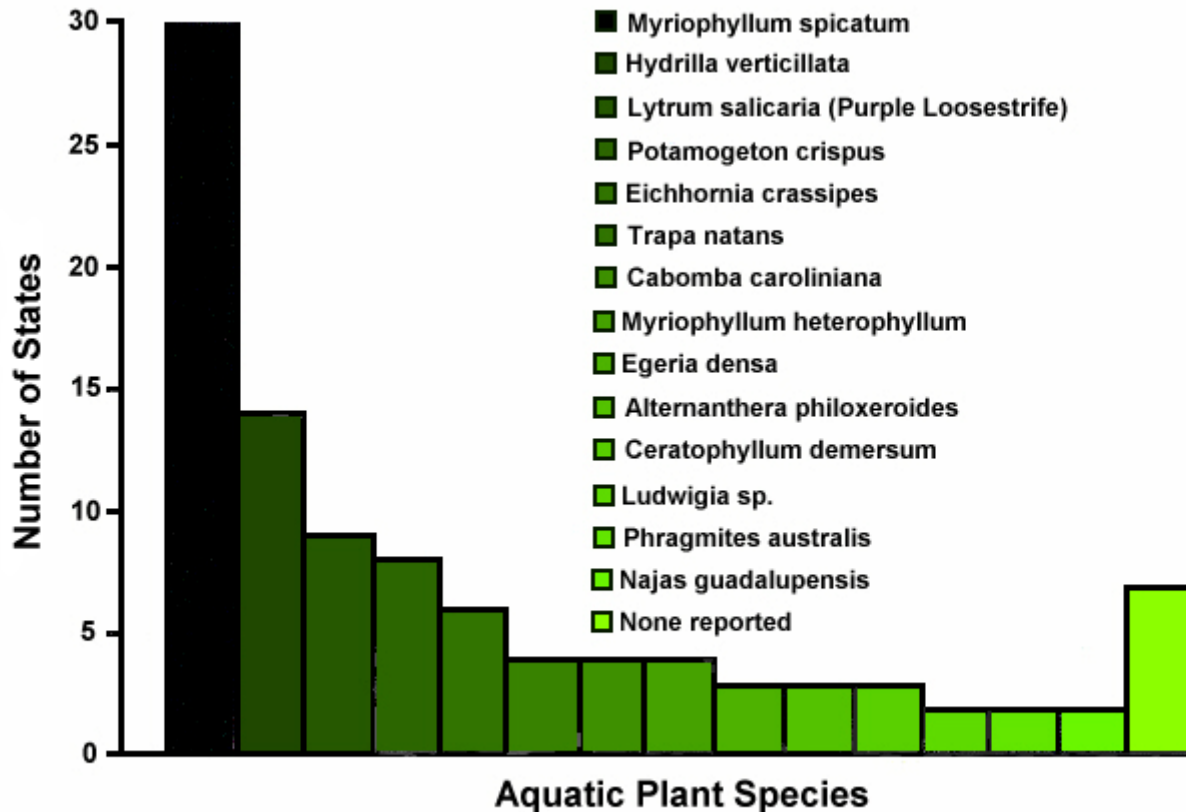
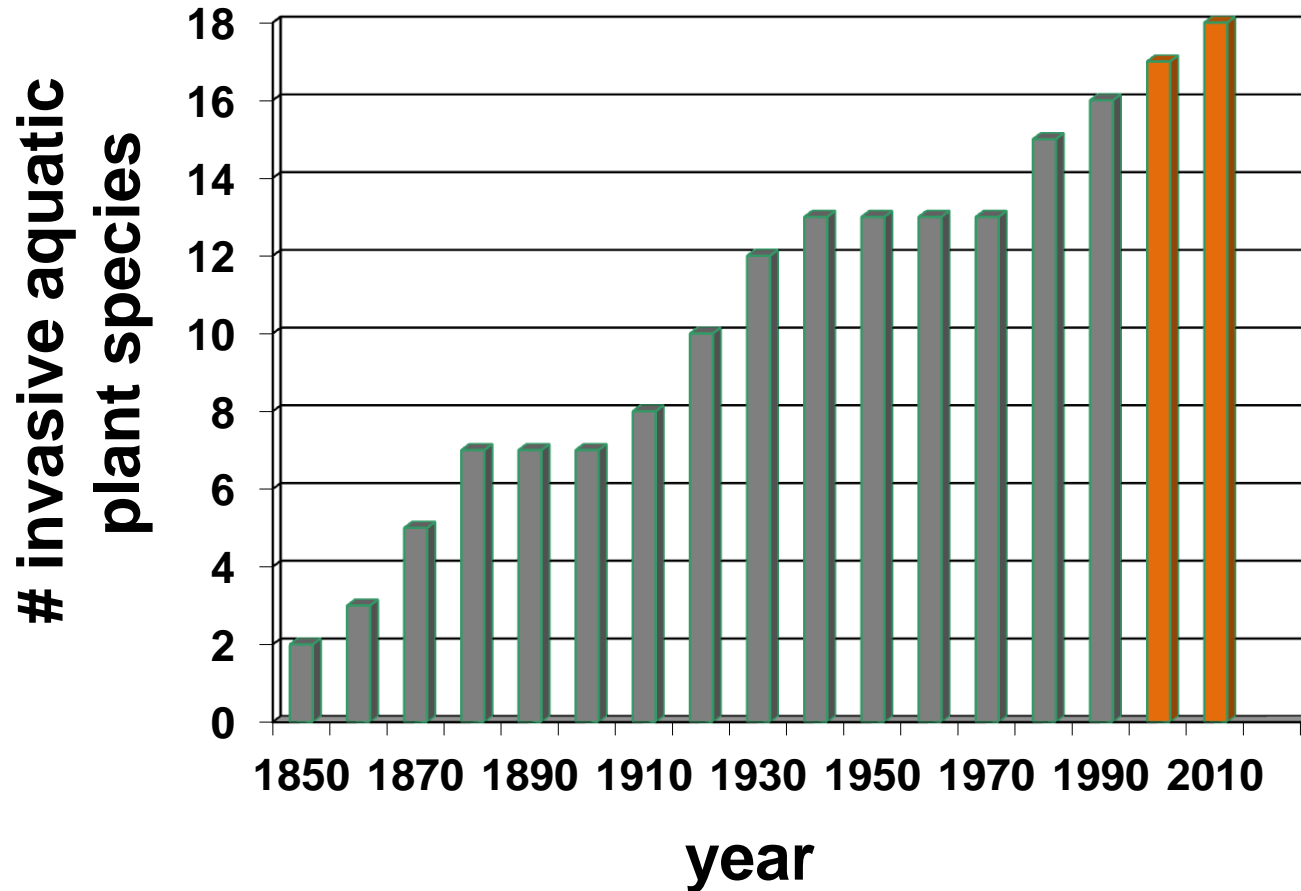


Figure 3. Aquatic plant species that are a management concern in two or more states.

On average, one new invasive aquatic plant has been added to the flora of the northeastern United States each decade for the past 160 years.



Utricularia inflata

Glossostigma cleistanthum

Utricularia inflata



***Utricularia inflata* in Connecticut/MA:**

Massachusetts:

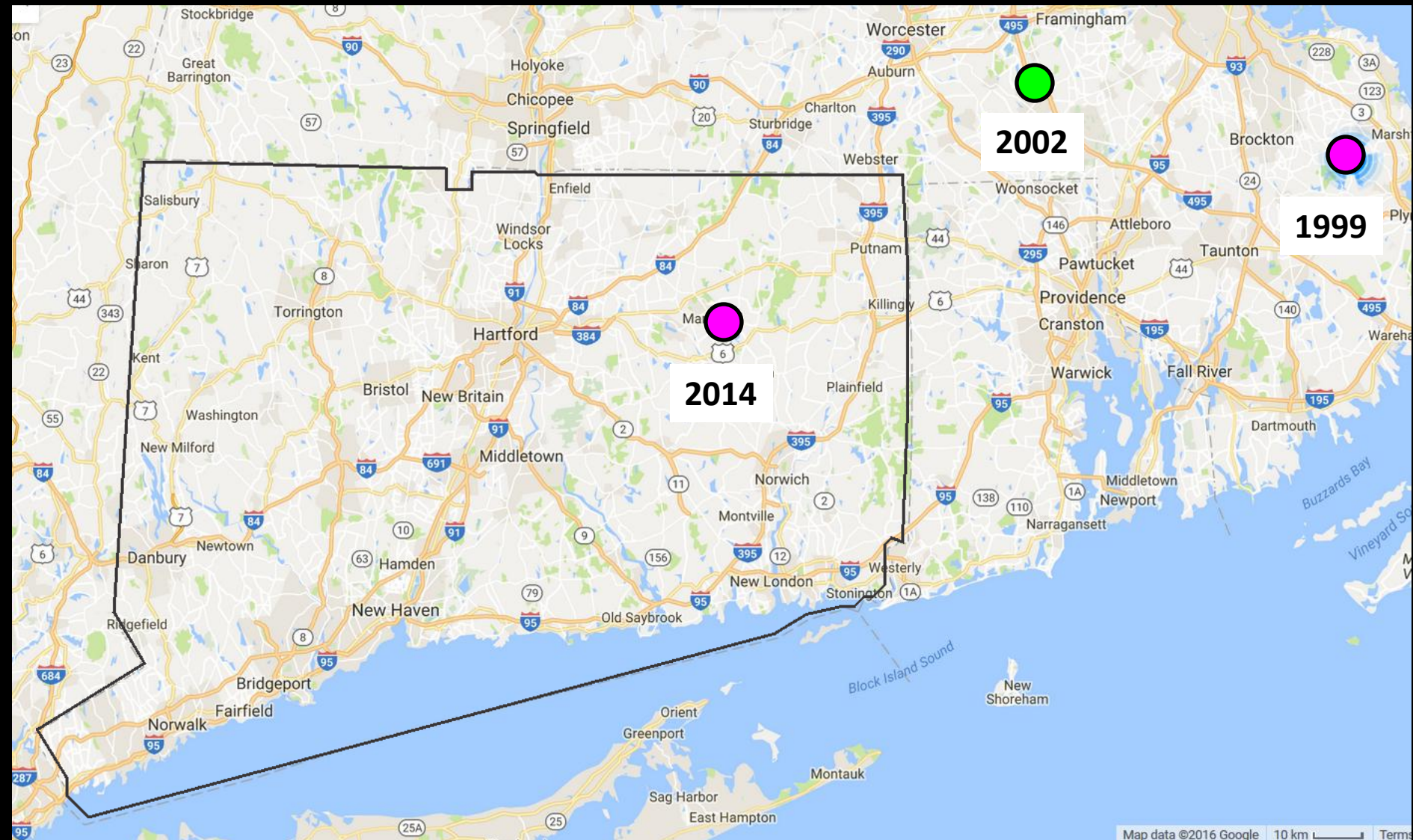
1999: Furnace Pond (Carver)

2002: Louisa Lake (Milford)

Connecticut:

2014: Echo Lake (Mansfield) [2015, 2016]

Utricularia inflata in Connecticut/MA (CONN records)



So far only one site every 5 years.

It is difficult to identify *U. inflata* when only the submersed foliage is present



Hydrilla verticillata



***Hydrilla verticillata* in Connecticut:**

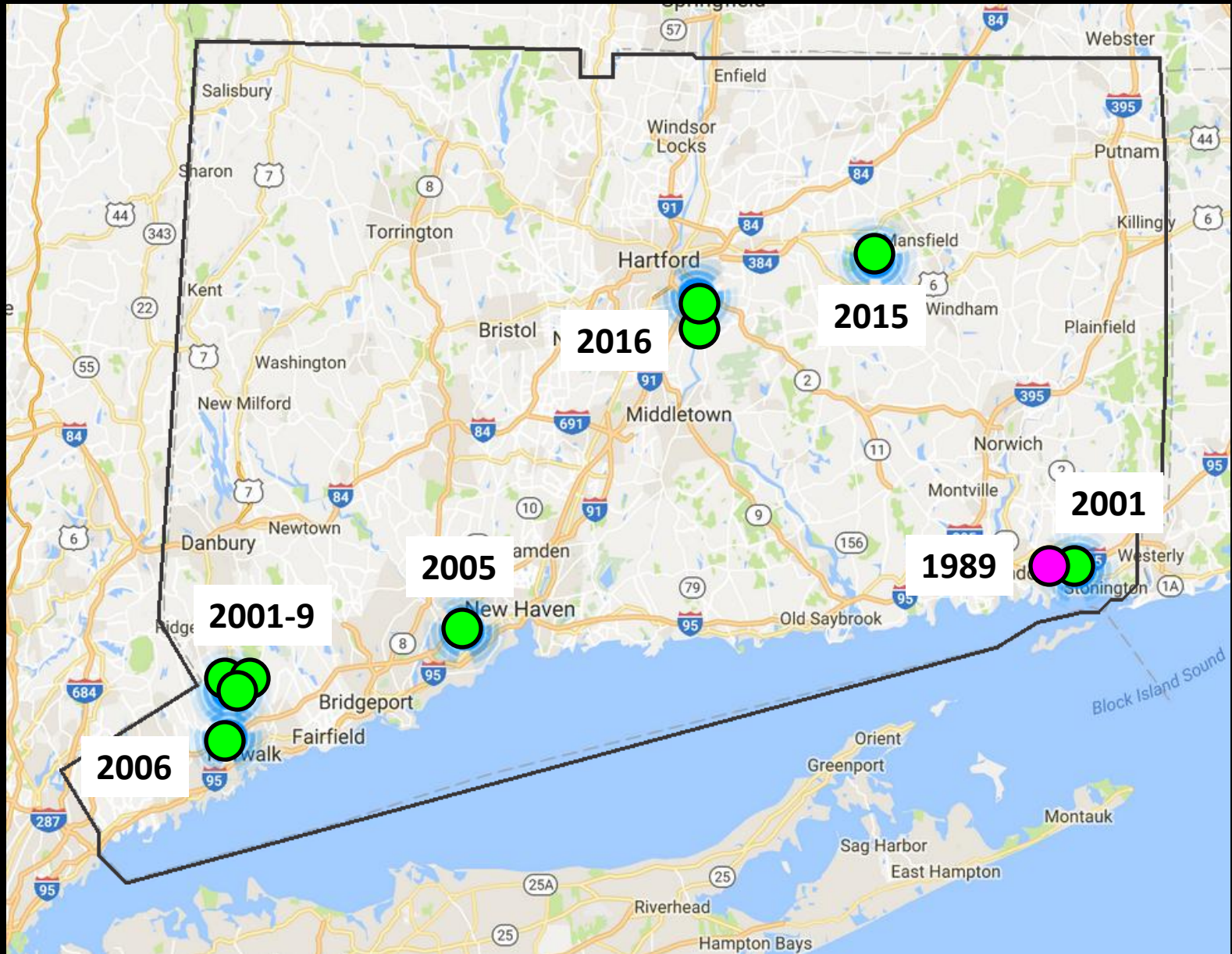
- 1989: Mystic Seaport (Mystic) [1996, 1997, **2003, 2005, 2006, 2007**]
- 2001: Mason's Island (Stonington)
Quiet Lake (Wilton)
- 2003: Hirsch Property (Wilton)
- 2005: Von Kleydorf's Pond (Wilton)
Cozsa Property (Orange)
- 2006: Silvermine River (Norwalk)
- 2009: Crystal Lake (Wilton)
- 2015: Coventry Lake (Coventry)
- 2016: Keeney Cove (Glastonbury)***
- 2016: Connecticut River (Glastonbury)

Eleven sites within 27 years – ***a new locality reported every 2.5 years***

red = post-management dates

***site of 1999 *Trapa* record

Hydrilla verticillata in Connecticut (CONN records)



Cabomba caroliniana



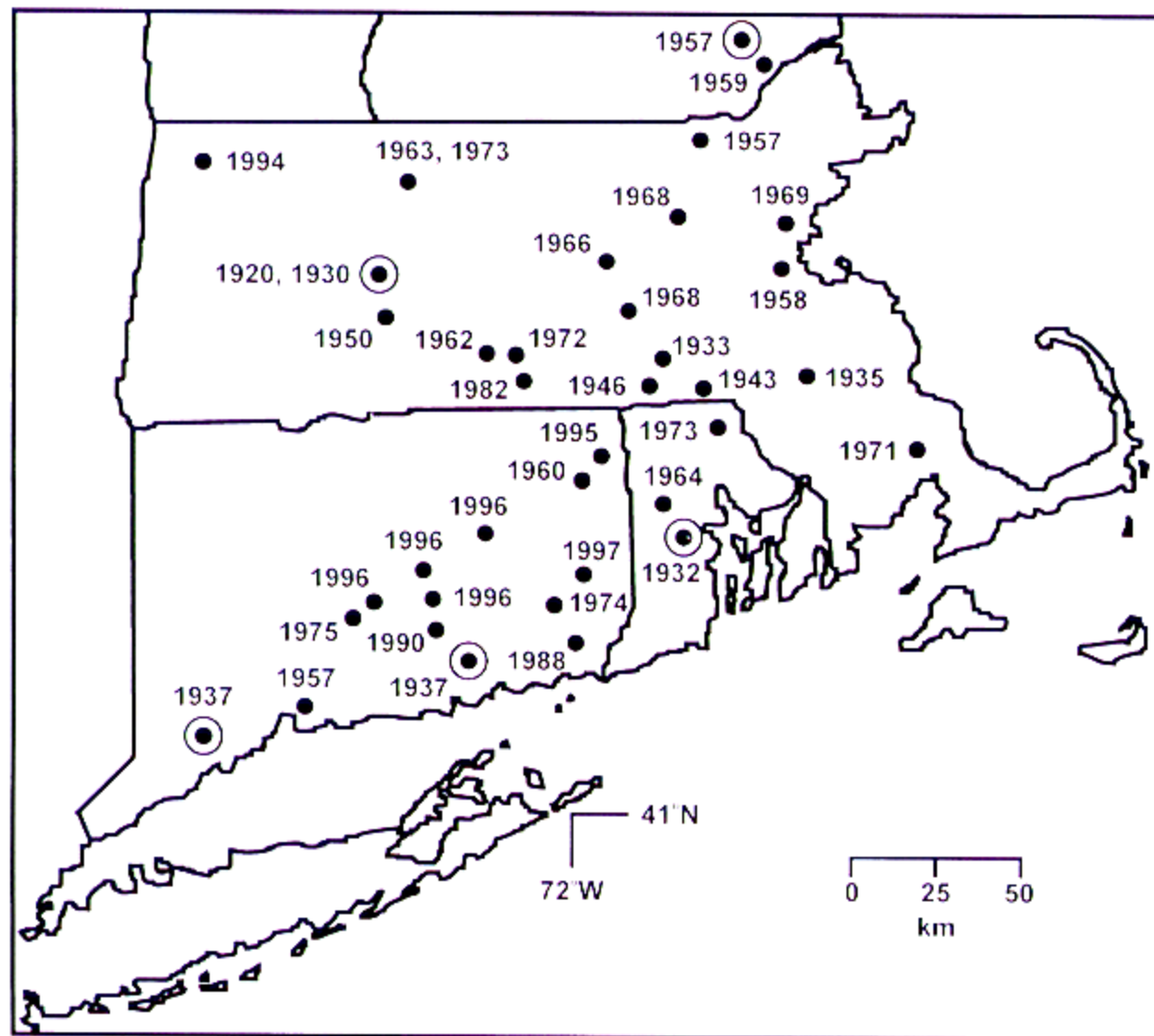


Figure 4. Distribution of *Cabomba caroliniana* in southern New England derived from specimens observed at regional herbaria (collection dates shown). Double circles indicate the oldest known specimen record(s) for that state. The distribution of *Cabomba* in Connecticut is similar to that of *Myriophyllum heterophyllum* (see Figure 5).

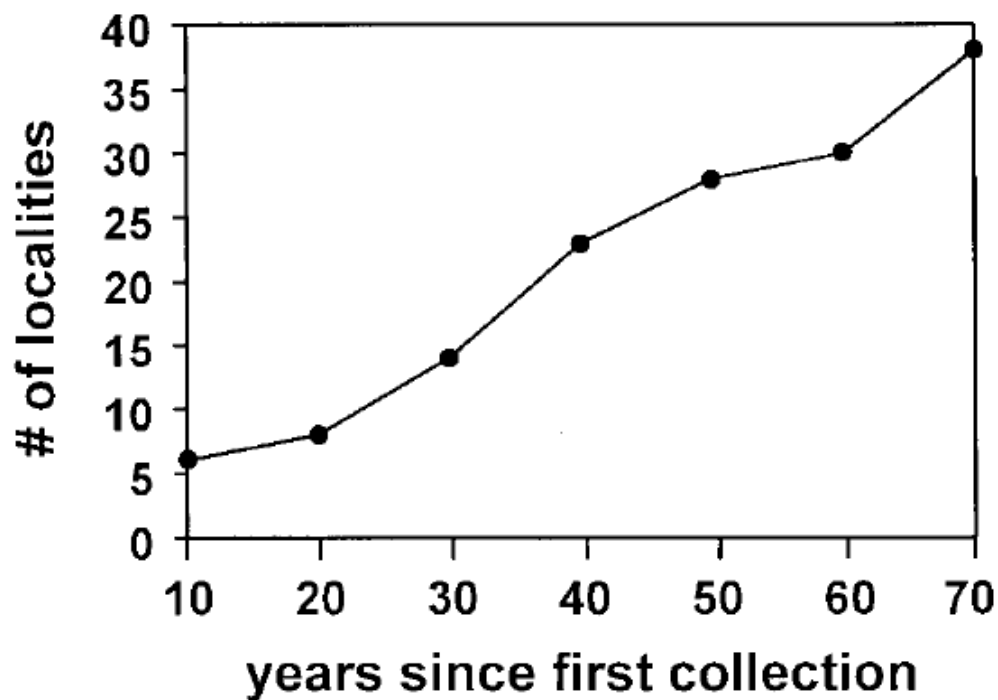
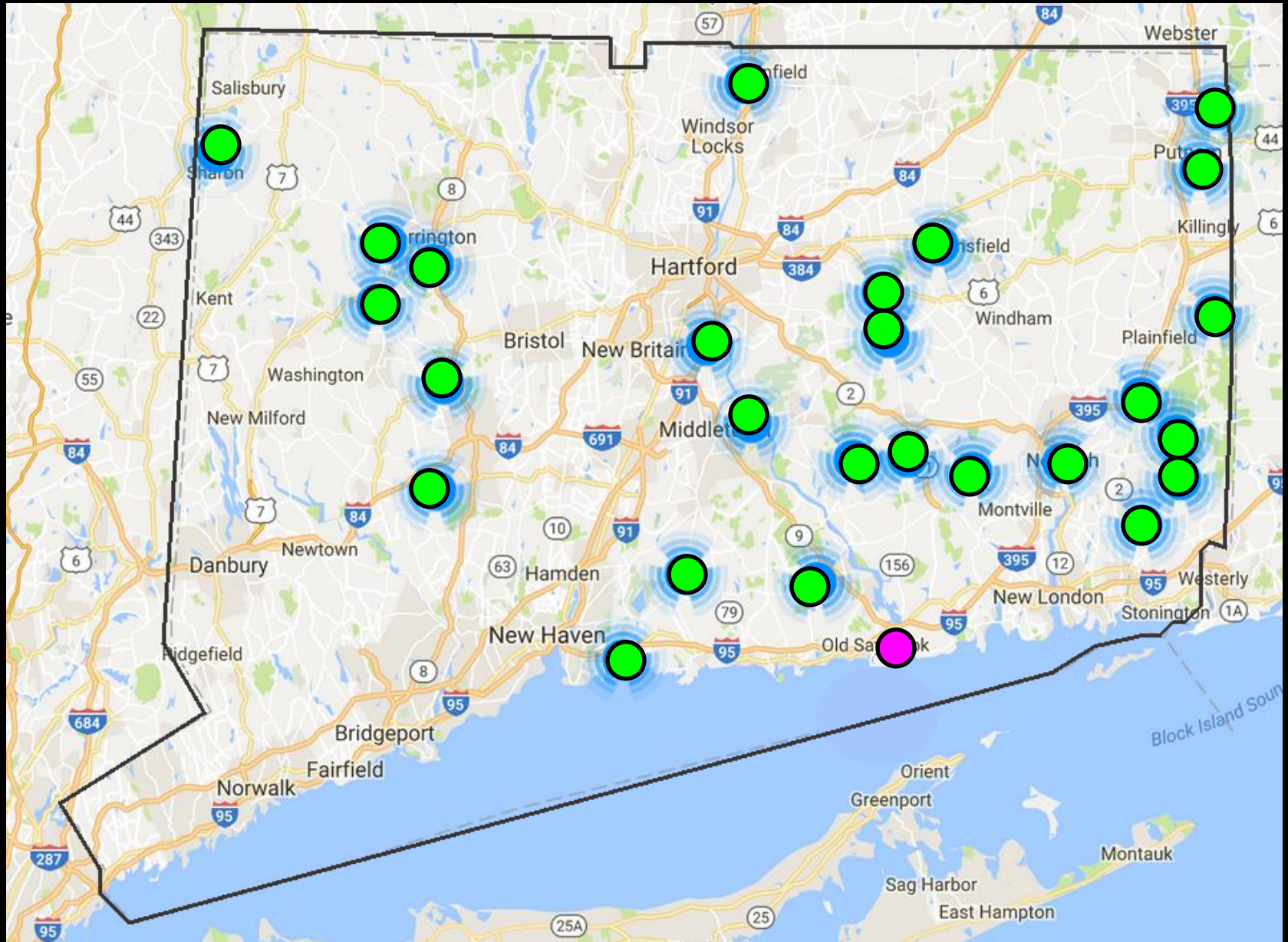


Figure 3. Collection curve for *Cabomba caroliniana* in southern New England (data from Figure 4) indicates continued spread in the region with no sign of abatement. *Cabomba* is indigenous to the southeastern United States and was first found in southern New England in 1920.

39 sites within 89 years – *a new locality reported every 2.1 years*

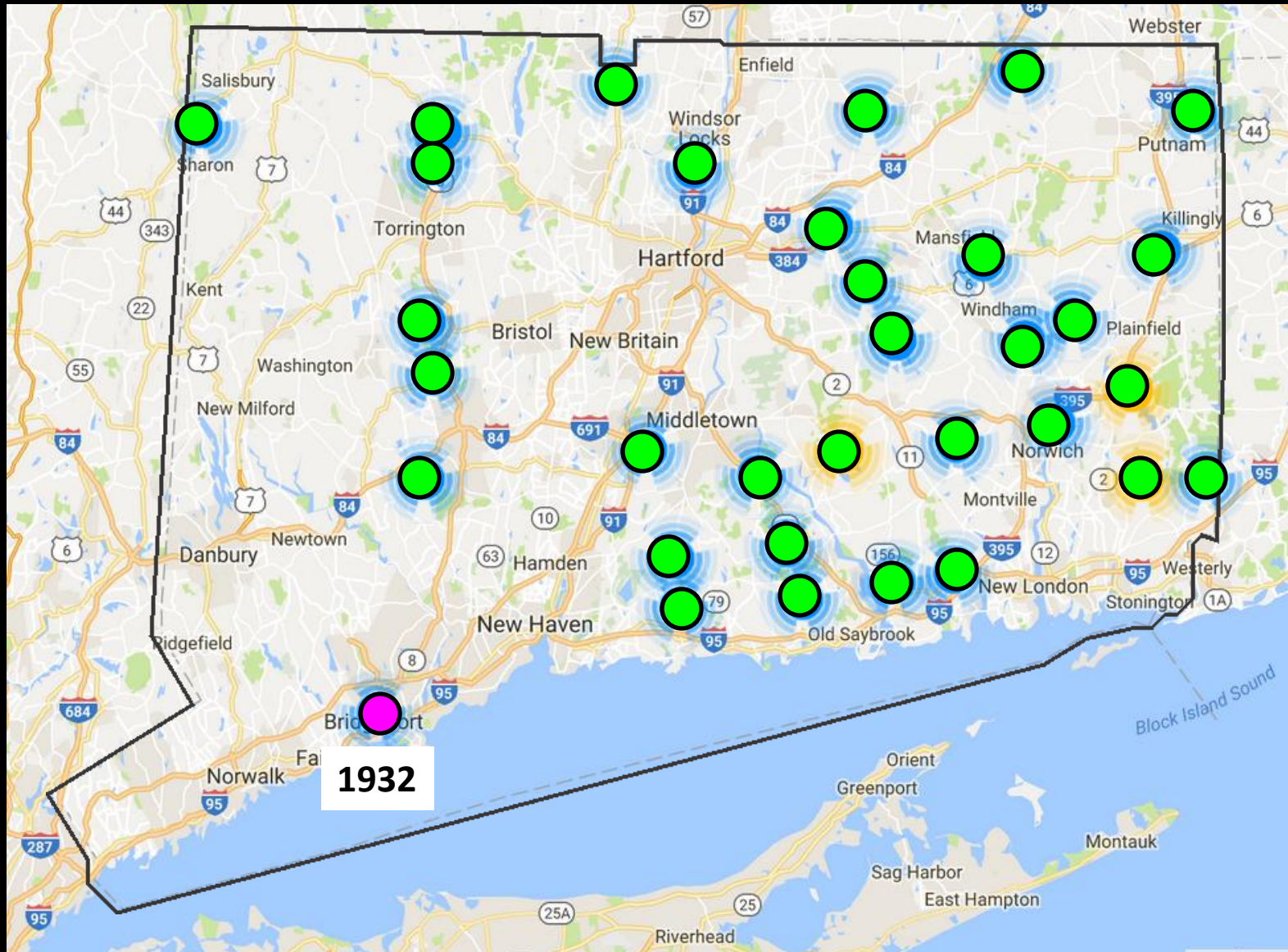


Myriophyllum heterophyllum



***Myriophyllum heterophyllum* in Connecticut:**

45 sites within 84 years – *a new locality reported every 1.9 years*





Glossostigma cleistanthum



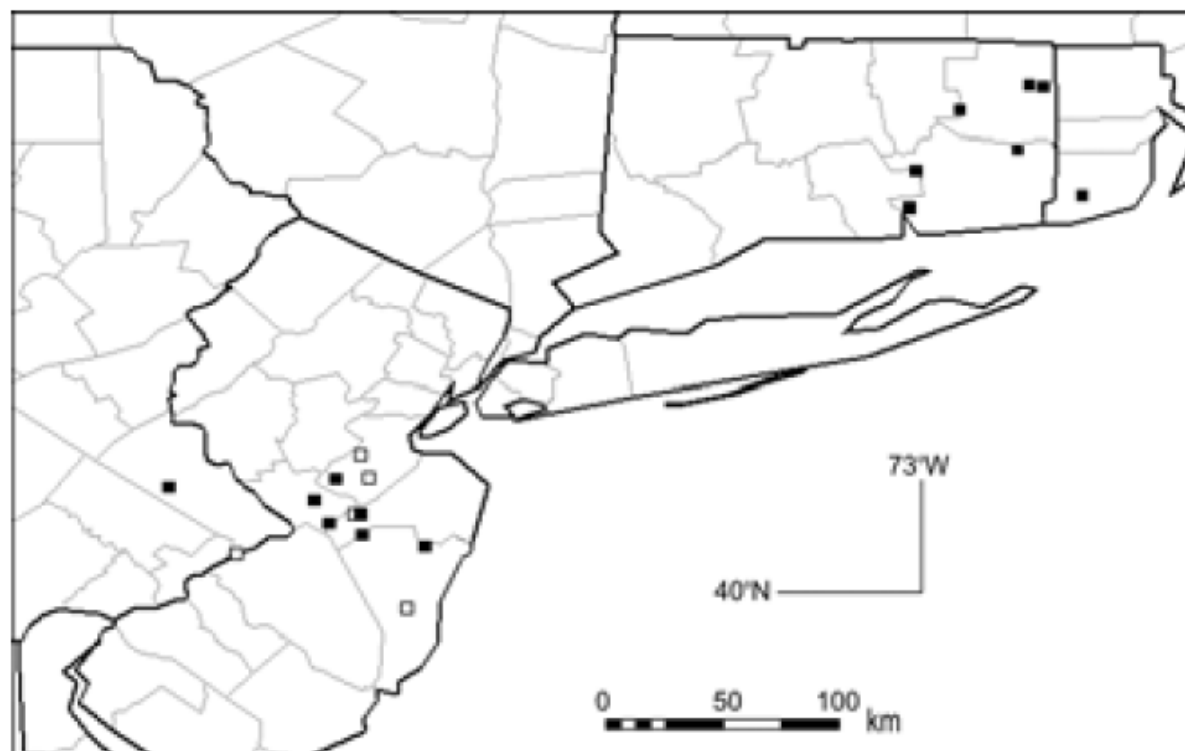


Fig. 3. Map showing the location of 19 sites where *Glossostigma* has been found in North America (see Appendix). Closed squares indicate populations surveyed for molecular analysis; open squares indicate populations not surveyed.

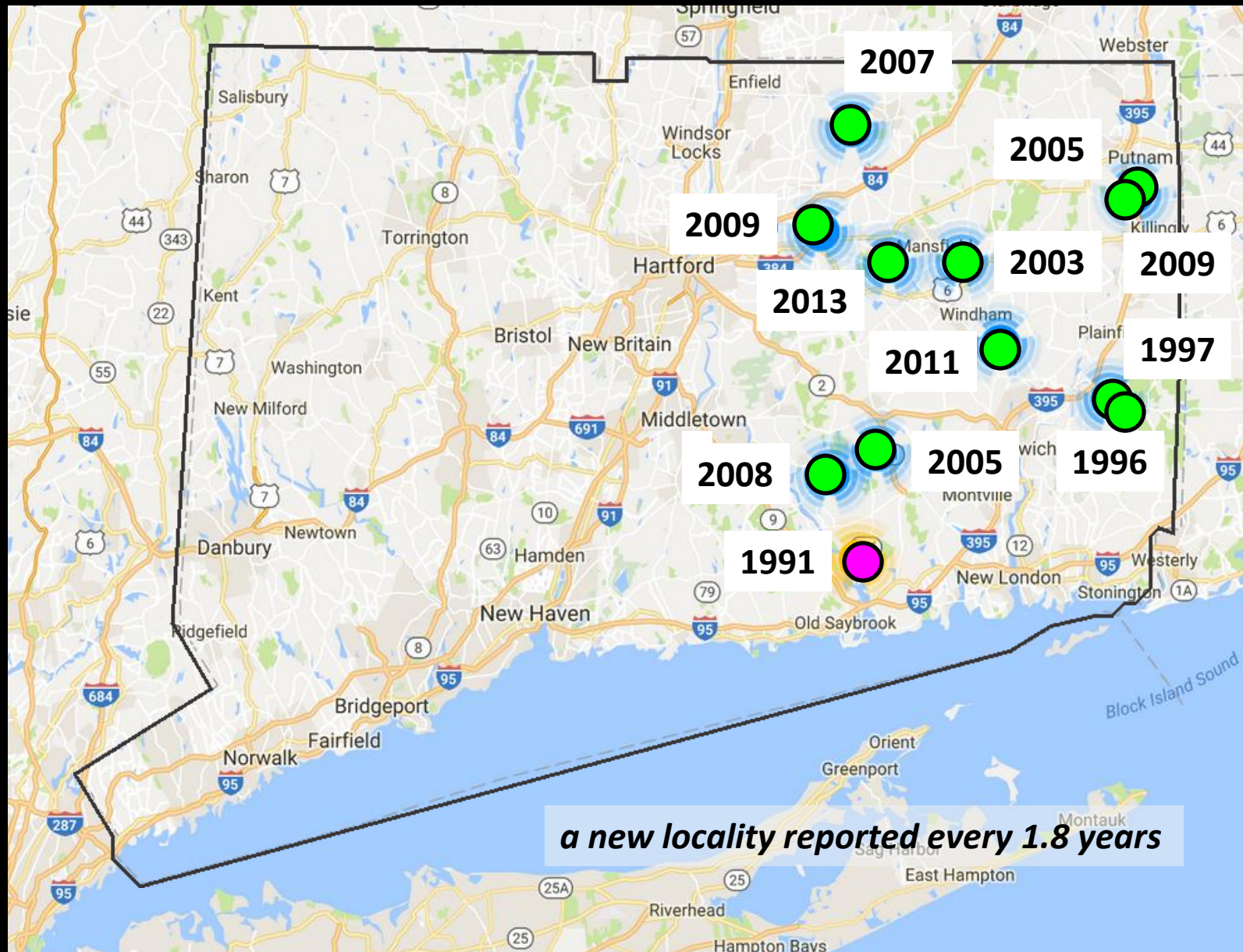
***Glossostigma cleistanthum* in Connecticut:**

- 1991: Hamburg Cove (Lyme) [1992, 1998, 2005, 2008]
- 1996: Hopeville Pond (Griswold) [1997]
- 2002: Pachaug River (Griswold)
- 2003: Mansfield Hollow (Mansfield) [2005, 2007, 2008, 2009, 2012, 2013, 2015]
- 2005: Lake Hayward (East Haddam) [2007]
Chase Reservoir (East Killingly)
Alexander Lake (Killingly) [2009]
- 2007: Pachaug Pond (Griswold)
Crystal Lake (Ellington)
- 2008: Bashan Lake (East Haddam)
- 2009: Lower Bolton Lake (Bolton)
- 2011: Shetucket River (Scotland)
- 2013: Coventry Lake (Coventry)***
- 2015: Glasgo Pond (Voluntown)

14 sites within 25 years – ***a new locality reported every 1.8 years***

***site of 2015 *Hydrilla* record

Glossostigma cleistanthum in Connecticut (CONN records)



Trapa natans

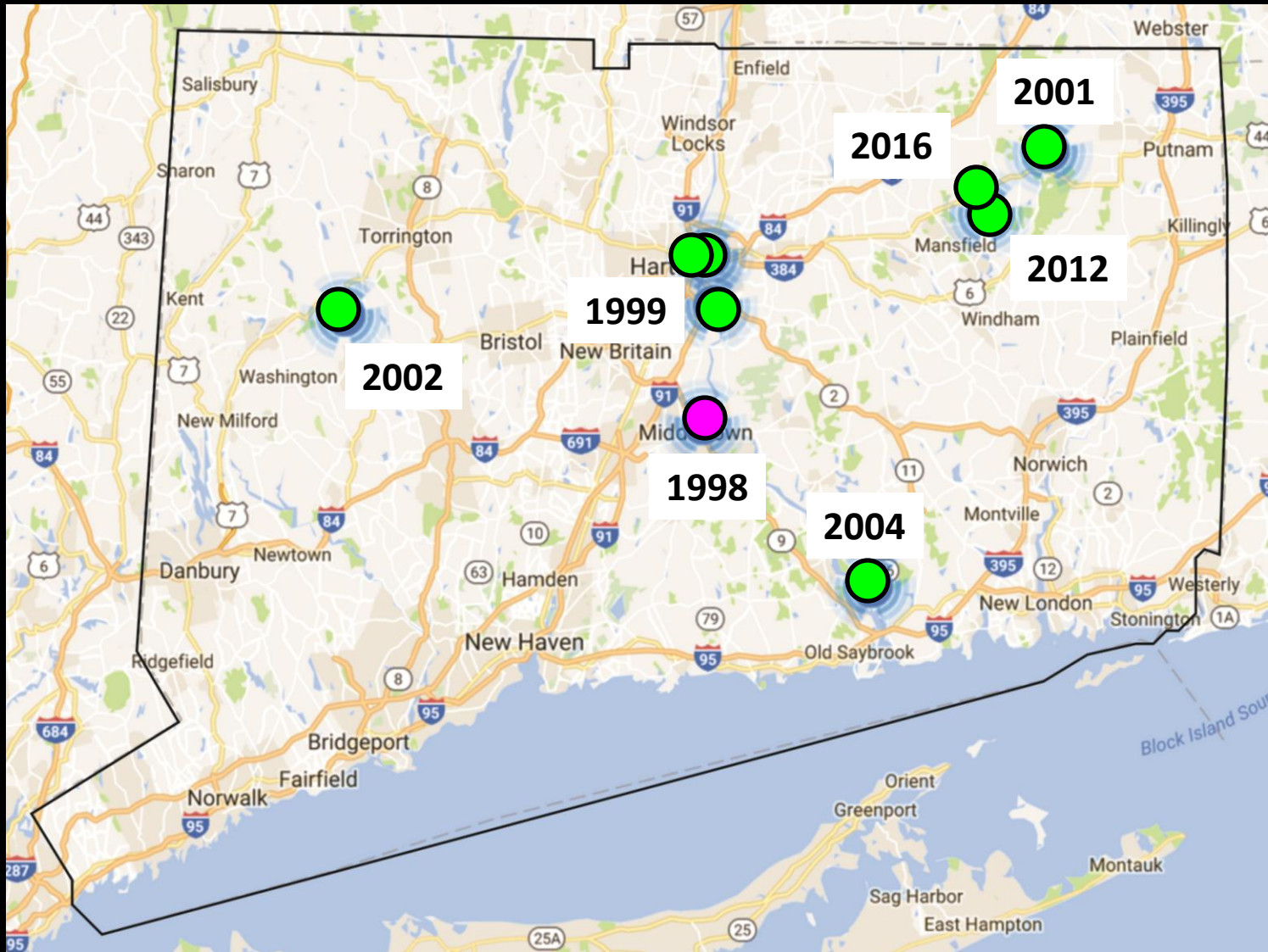


***Trapa natans* in Connecticut:**

- 1998: Connecticut River (Portland)
- 1999: Keeney Cove (Glastonbury)
Hockanum River (East Hartford) [2002, 2005]
Riverside Park (Hartford) [2005]
- 2001: Westford Road (Eastford)
- 2002: Bantam Lake (Morris)
- 2004: Abigail's Hole (Lyme)
- 2012: McLaughlin Pond (Mansfield) [2015]
- 2016: Anderson pond (Mansfield)

Nine sites within 16 years – ***a new locality reported every 1.8 years***

Trapa natans in Connecticut (CONN records)

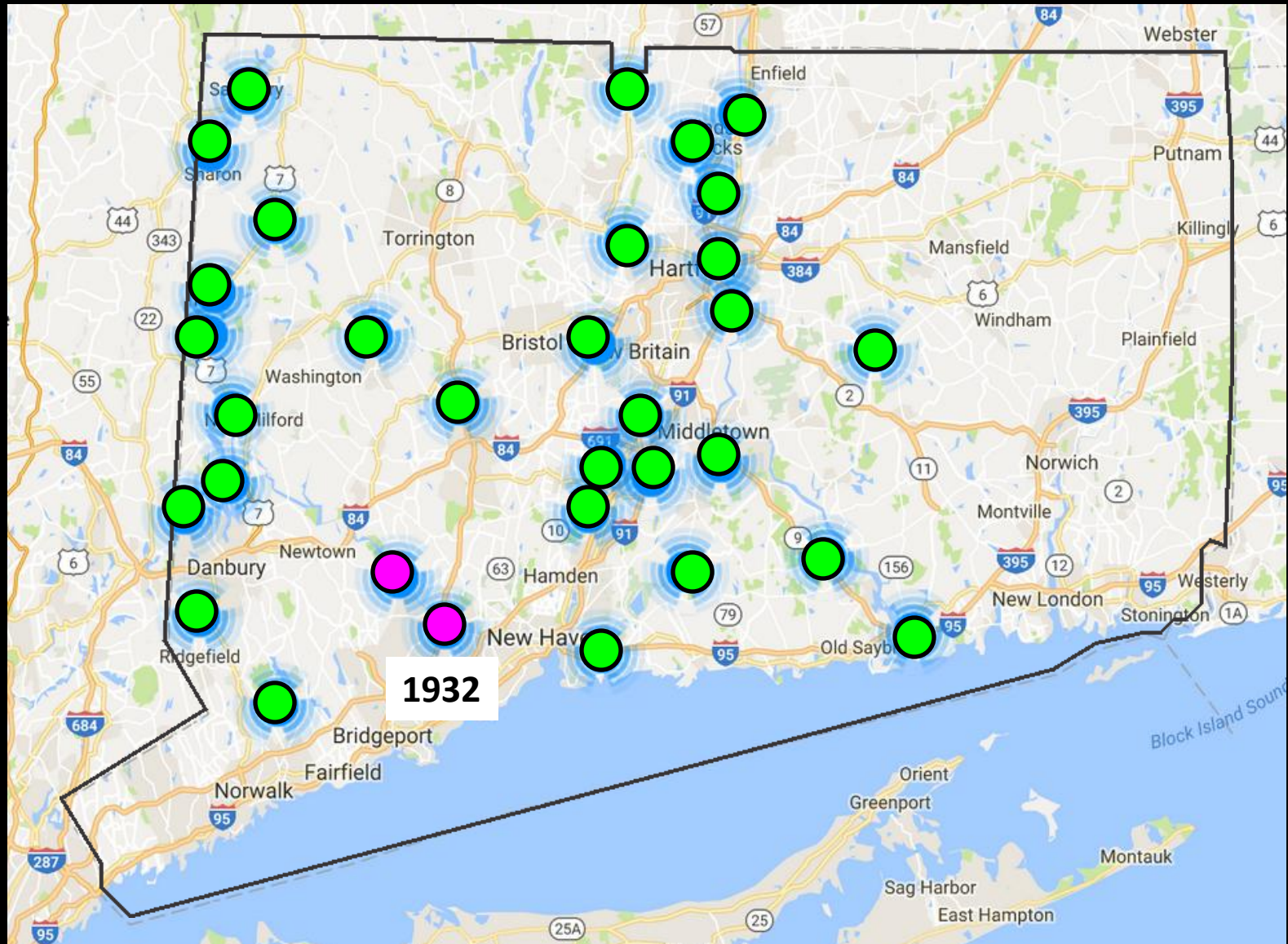




Potamogeton crispus

Potamogeton crispus in Connecticut:

52 sites within 84 years – *a new locality reported every 1.6 years*

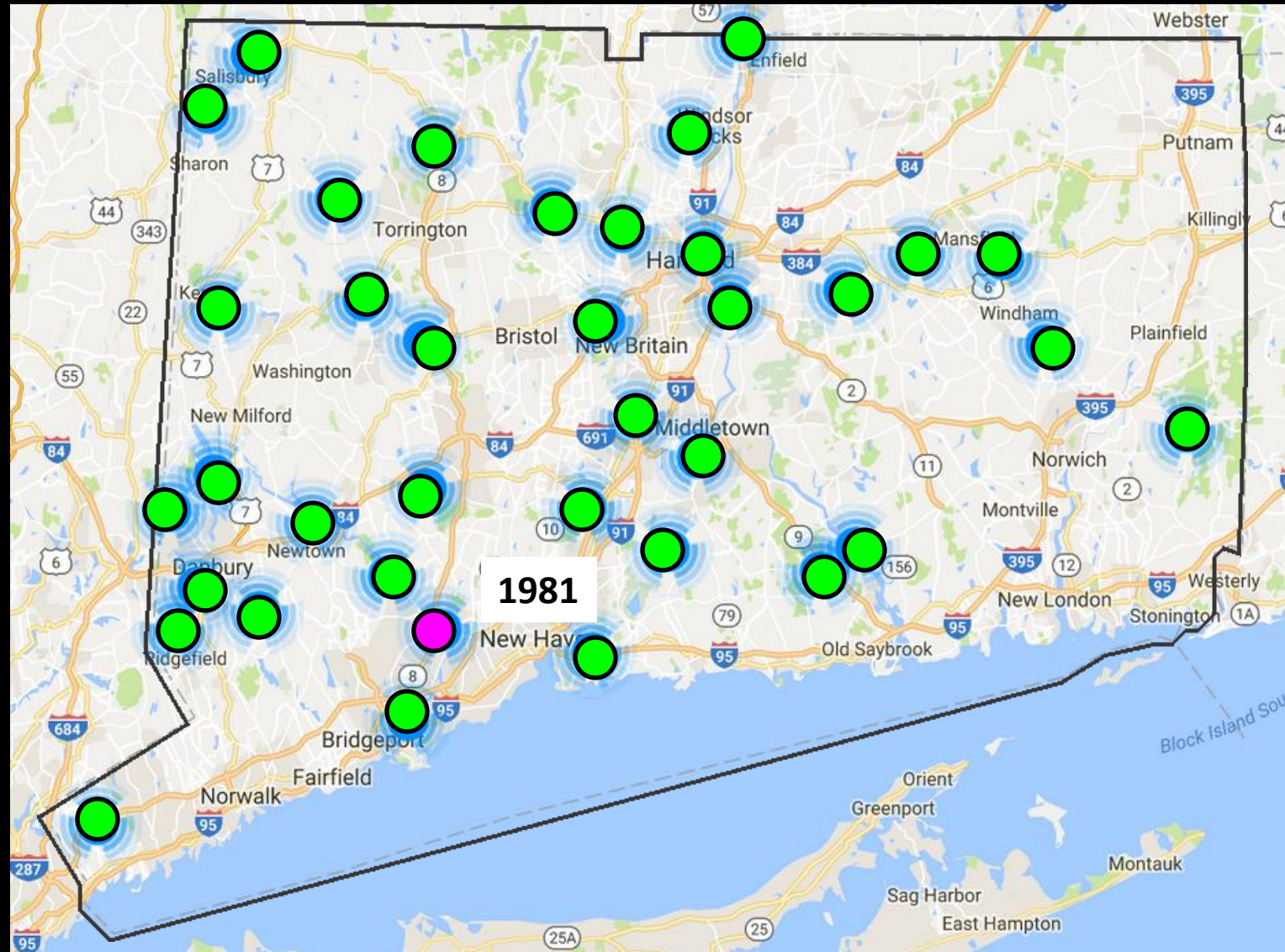


Myriophyllum spicatum



Myriophyllum spicatum in Connecticut:

51 sites within 35 years – *a new locality reported every 0.69 years*

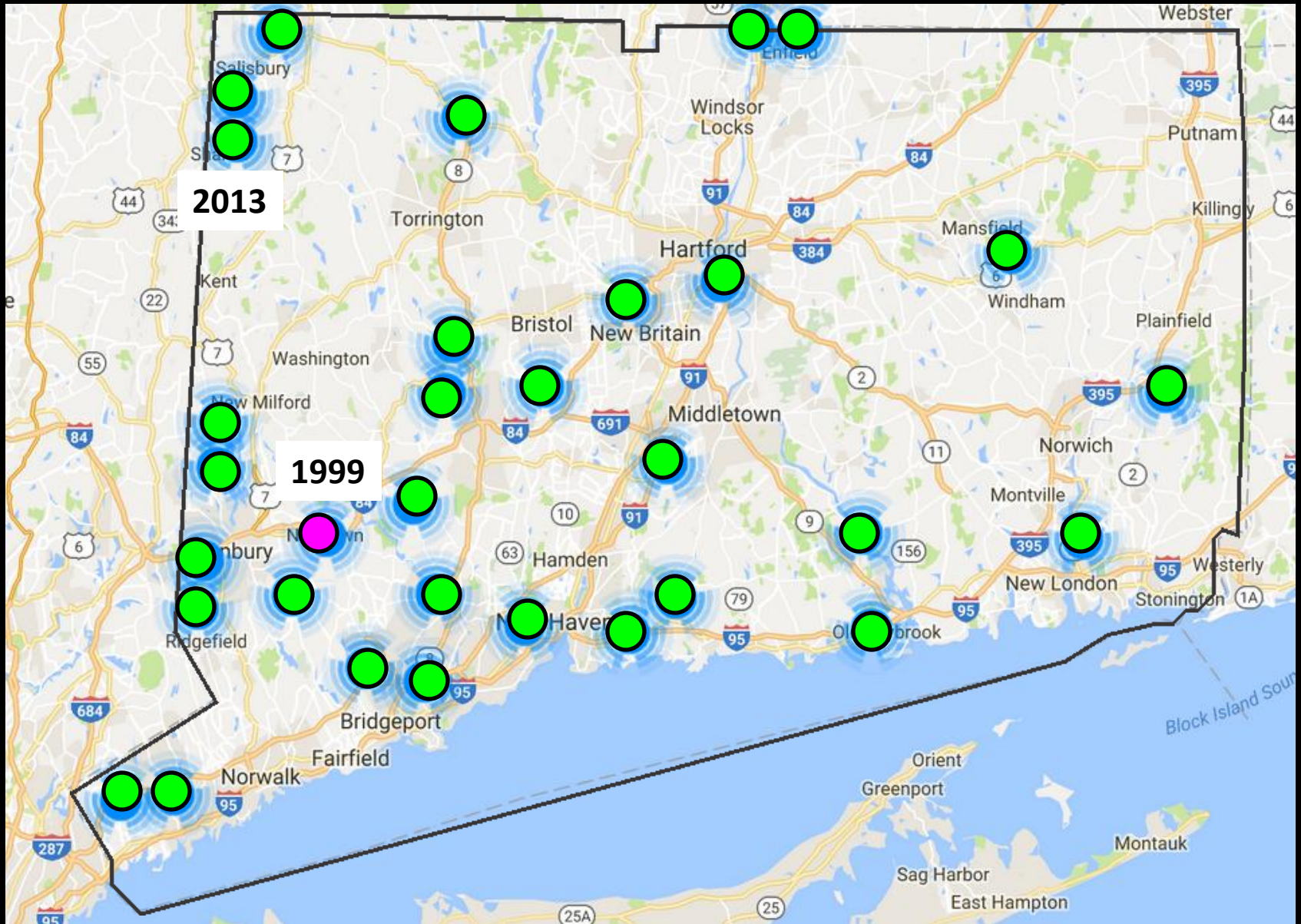


Najas minor



***Najas minor* in Connecticut:**
45 sites within 21 years – ***a new locality reported every 0.47 years***

45 sites within 21 years – ***a new locality reported every 0.47 years***



The spread of invasive aquatic plants in Connecticut

Species	# new sites/year
<i>Utricularia inflata</i>	0.20
<i>Hydrilla verticillata</i>	0.40
<i>Cabomba caroliniana</i>	0.48
<i>Myriophyllum heterophyllum</i>	0.53
<i>Glossostigma cleistanthum</i>	0.56
<i>Trapa natans</i>	0.56
<i>Potamogeton crispus</i>	0.63
<i>Myriophyllum spicatum</i>	1.45
<i>Najas minor</i>	2.13
Average:	0.77
	(~ 7 new records/yr)

Does early detection help?

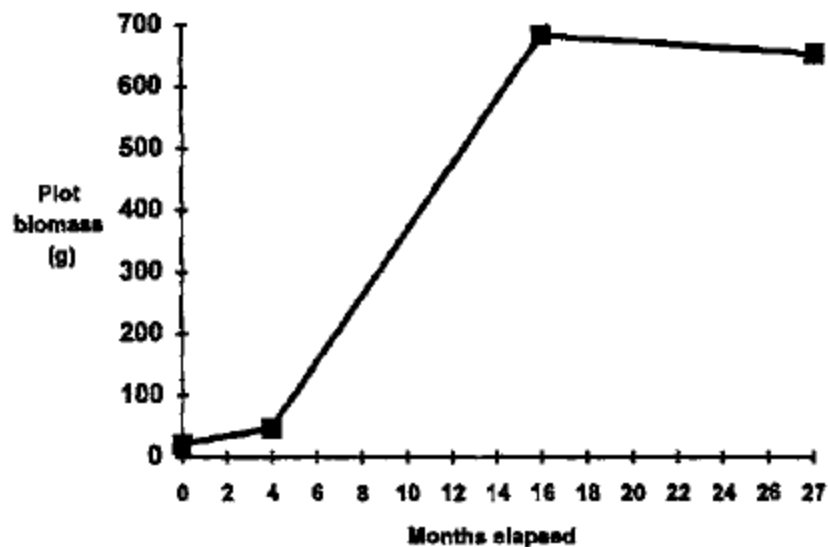
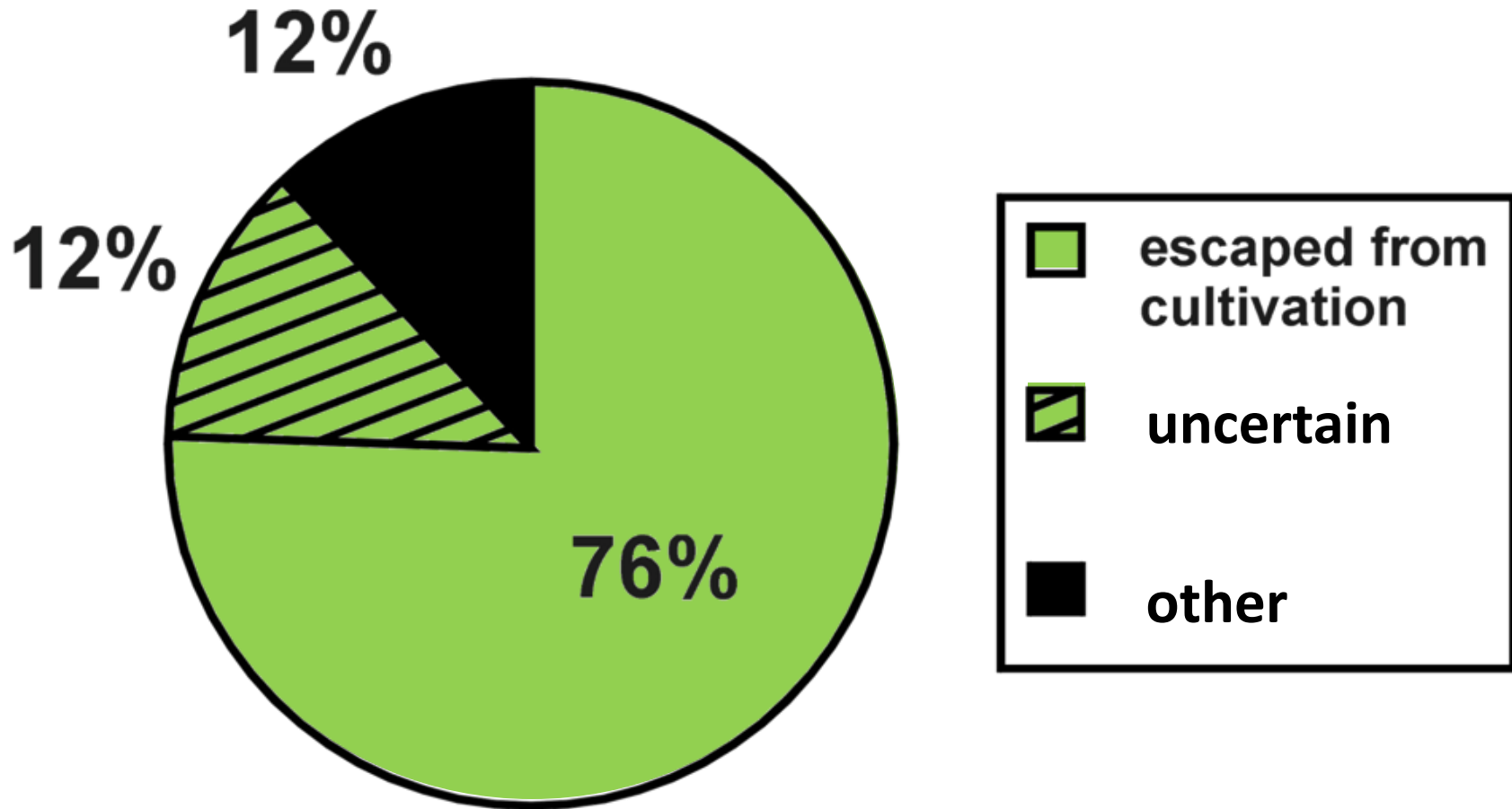


Figure 1. Asexual reproduction in aquatic plants occurs rapidly. Biomass (grams of dry weight) measured in 2 m \times 2 m field plots planted initially with 100 small fragments of Eurasian water milfoil (*Myriophyllum spicatum*). Within 16 months, vegetative growth had reached maximum biomass levels (carrying capacity). Biomass had more than doubled during the first four-month growing season (from Les et al. 1988).

“Over three-quarters of all aquatic plant introductions in the northeastern United States have resulted from careless cultivation practices” (Les, 2002).



[Back to list of items](#)

Listed in category: [Home & Garden](#) > [Pet Supplies](#) > [Fish, Turtles & Frogs](#) > [Live Aquarium Plants](#)

AQUARIUM PLANTS GLOSSOSTIGMA TWO BUNCHES

Item number: 290009671747

Buyer or seller of this item? [Sign in](#) for your status

[Watch this item](#) in My eBay | [Email to a friend](#)

[View larger picture](#)
Buy it Now price: **US \$2.35** [Buy It Now >](#)

End time: **Jul-26-06 15:55:45 PDT**
(5 days 7 hours)

Shipping costs: [Calculate](#)

Ships to: United States

Item location: Tampa, Florida, United States

You can also: [Watch this item](#)

Get alerts via [Text message](#) or [IM](#)
[Sell one like this](#)

Listing and payment details: [ShowShow](#)

Meet the seller

Seller: [aquatic6414](#) (2920 ★)

Feedback: **97.6% Positive**

Member: since Jan-30-02 in United States

- [Read feedback comments](#)
- [Ask seller a question](#)
- [Add to Favorite Sellers](#)
- View seller's other items: [Store](#) | [List](#)
- Visit seller's Store: [Aquarium and Pond Plants](#)

Buy safely

1. Check the seller's reputation

Score: 2920 | 97.6% Positive
[Read feedback comments](#)

2. Learn how you are protected

Shop without sharing your financial details
 [Learn more](#)

Description

Aquarium and Pond Plants


Visit my eBay Store: [Aquarium and Pond Plants](#)
[Bunch Plants](#) | [Aquarium Assortments](#)

Search my eBay Store:

 Search

Emerged Foreground Light: Bright: 3.5-4.5 watts Temperature: Medium: 73-83 F. (23-28 C.) Neutral: pH 7.0
Distribution: Australia & New Zealand Reproduction: Runners/Cuttings Difficulty: Medium THIS IS FOR TWO BUNCHES WITH LEAD BANDS WE DO COMBINE SHIPPING PLEASE PICK THE ASK FOR A INVOICE IN THE AUCTION DO NOT PAY TILL YOU GET A FULL INVOICE FROM US THERE IS A FLAT SHIPPING FEE OF \$7.95 FOR AS MUCH AS YOU BUY THANKS WE GUARANTEE THE ARRIVAL OF QUALITY PRODUCTS. IF THERE IS A PROBLEM YOU ARE OBLIGATED TO NOTIFY US WITHIN 24 HOURS BY PHONE OR EMAIL. OUR BUSINESS HOURS ARE MONDAY-THURSDAY 7:30 A.M.-4:30 P.M. FRIDAY 7:30A.M.-12:00P.M. EASTERN/STANDARD TIME SATURDAY AND SUNDAY WE ARE CLOSED YOU CAN SEND AN EMAIL 24 HOURS A DAY 7 DAYS A WEEK THANK YOU

A photograph of the United States Capitol building in Washington, D.C., featuring its iconic dome and neoclassical architecture. The building is partially obscured by green trees on the right side. The sky is blue with some white clouds.

Lacey Act

Enacted in 1900 [amended in 2008]. Prohibits illegal import of plants in violation of State or international law

Lacey Act: Frequently Asked Questions (April 28, 2016)

What are the penalties for violating the amended Lacey Act?

- Civil Penalties –monetary penalties up to \$10,000 **may** be imposed, **depending on** the nature, circumstances, extent, and gravity of the prohibited act committed and the violator’s culpability, **ability to pay**, and such other matters as justice may require
- Criminal Penalties – fines, penalties and potential incarceration
 - A felony or misdemeanor depending on, primarily, the **defendant’s knowledge of the underlying illegality of the product at issue**
 - misdemeanors: \$100,000 for individuals or \$200,000 for organizations, or imprisoned not more than one year, or both, for each violation.
 - felonies: \$250,000 for individuals or \$500,000 for organizations or twice the amount of the gross gain or loss, or imprisoned up to 5 years, or both, for each violation.
- Forfeiture – dispossession of the plant, fish, or wildlife in question

In addition, any person who commits a marking offense or violates the declaration requirements, except for knowing violators, may be assessed a penalty up to \$250.

Will there be an “enforcement plan?” Will specific countries/products be targeted?

“There **will not** be an “enforcement plan” ... “

Will additional resources be made available for enforcement? Will additional investigators and prosecutors be hired?

“Congress has not allocated any specific funds ... to enforce the new provisions.”

Aldrovanda vesiculosa – coming soon to your local bog!



Lamont, E. E., R. Sivertsen, C. Doyle & L. Adamec. 2013. Extant populations of *Aldrovanda vesiculosa* (Droseraceae) in the New World. *J. Torrey Bot. Soc.* **140**: 517–522.

Virginia Sites. A few growers of carnivorous plants from north-central Virginia had small backyard ponds supporting several native species of *Utricularia*. During the late 1980s to early 1990s, some of these growers introduced dormant turions of *A. vesiculosa* from Japan into their backyard ponds.

New Jersey Sites. In 1999, Sivertsen planned and implemented an assisted colonization of *A. vesiculosa* in northern New Jersey because the action might save the genome for future studies and conservation initiatives if the species becomes extinct in its natural Old World habitats.



Shop by
category ▾

Search...

All Categories ▾

Search

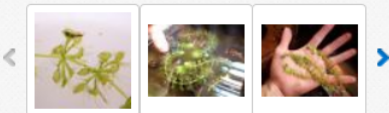
Advanced



[Back to search results](#) | Listed in category: [Home & Garden](#) > [Yard, Garden & Outdoor Living](#) > [Plants, Seeds & Bulbs](#) > [Plants & Seedlings](#) > [Other Plants & Seedlings](#)



Mouse over image to zoom



\$ Have one to sell?

[Sell now](#)

Aldrovanda vesiculosa, Waterwheel Plant, Aquatic venus flytrap! 2 plants

Item condition: --

Time left: 10d 22h 10/21, 8:35AM

Quantity:

1

More than 10 available / 1 sold

Price: **US \$7.00**

[Buy It Now](#)

[Add to cart](#)

2 watching

[Add to watch list](#)

[Add to collection](#)

Located in United States

Free local pickup

Shipping: **\$7.00** Expedited Shipping | [See details](#)

Item location: Woodford, Virginia, United States

Ships to: United States

Delivery: Estimated between **Fri. Oct. 14** and **Tue. Oct. 18** ⓘ

Payments:



Credit Cards processed by PayPal

PayPal CREDIT

Get more time to pay. [Apply Now](#) | [See Terms](#)

[See details](#)

Returns: Seller does not offer returns. You are covered by the [eBay Money Back Guarantee](#) if you received an item that is not as described in the listing.

Guarantee: **ebay MONEY BACK GUARANTEE** | [See details](#)

Get the item you ordered or get your money back.
Covers your purchase price and original shipping.



| [Add to watch list](#)

Seller information

[meadowview-sarracenia](#) (148 ★)

100% Positive feedback

[Follow this seller](#)

[See other items](#)

UP TO 70% OFF
AND FREE SHIPPING

[Shop top brands ▶](#)

ebay deals

What do YOU think should be done?



Summary:

- 1) Invasions of nonindigenous aquatic plants have continued unchecked despite all efforts to curtail them; once introduced **THEY WILL NOT GO AWAY**
- 2) Nearly all invasive aquatic plants originate from specimens cultivated for water gardens and aquariums
- 3) Many new threats exist and will inevitably materialize unless the sale and distribution of nonindigenous aquatic plants is stopped. **IT IS THE ONLY WAY TO KEEP INVASIVE AQUATIC PLANTS OUT OF THE REGION.**

Vinaka Maake Asante Shukria Dhanyavadagalu
감사합니다 Dank Je Dankscheen Kam Sah Hammida Manana Dankon
Blagodaram Ngiyabonga Dziekuje Mauruuru Biyan Chokrane Diolch i Chi Terima Kasih Matondo
Juspaxar Grazas dhanyawad Arigato Gracias Mochchakkeram Tack
நன்றி Ua Tsaug Rau Koj Bedankt Dakujem Hvala Di Ou Mesi cãm ơn bạn Tingki
Děkuji Suksama Nirringrazzjak Welalin Matur Nuwun 谢谢 xBana Danke Mercier Go Raibh Maith Agat Eskerrik Asko
Misaotra Rahmat Misaoatra Najis Tuke

Thank You

Maake Asante Shukria Dhanyavadagalu
감사합니다 Dank Je Dankscheen Kam Sah Hammida Manana Dankon
Blagodaram Ngiyabonga Dziekuje Mauruuru Biyan Chokrane Diolch i Chi Terima Kasih Matondo
Juspaxar Grazas dhanyawad Arigato Gracias Mochchakkeram Tack
நன்றி Ua Tsaug Rau Koj Bedankt Dakujem Hvala Di Ou Mesi cãm ơn bạn Tingki
Děkuji Suksama Nirringrazzjak Welalin Matur Nuwun 谢谢 xBana Danke Mercier Go Raibh Maith Agat Eskerrik Asko
Misaotra Rahmat Misaoatra Najis Tuke

