Connecticut's Invasive Aquatic Plants Searching for Solutions

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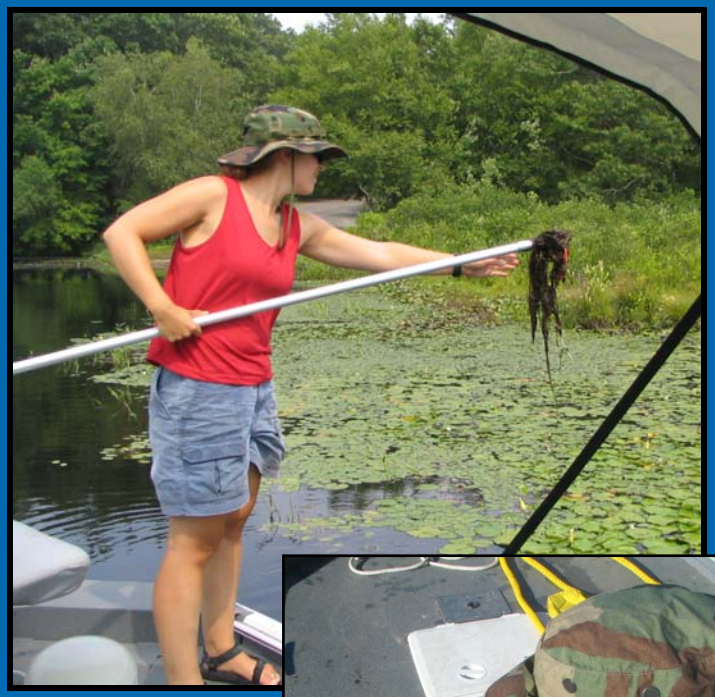
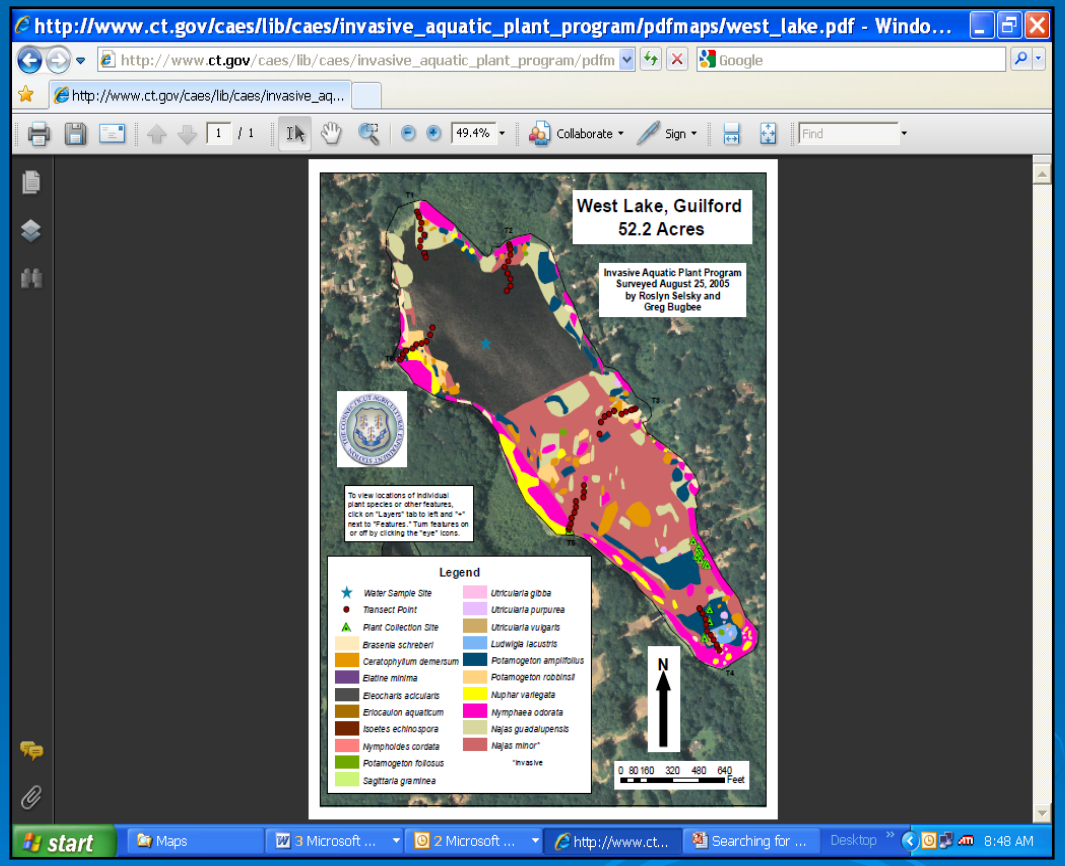
Invasive Aquatic Plant Program

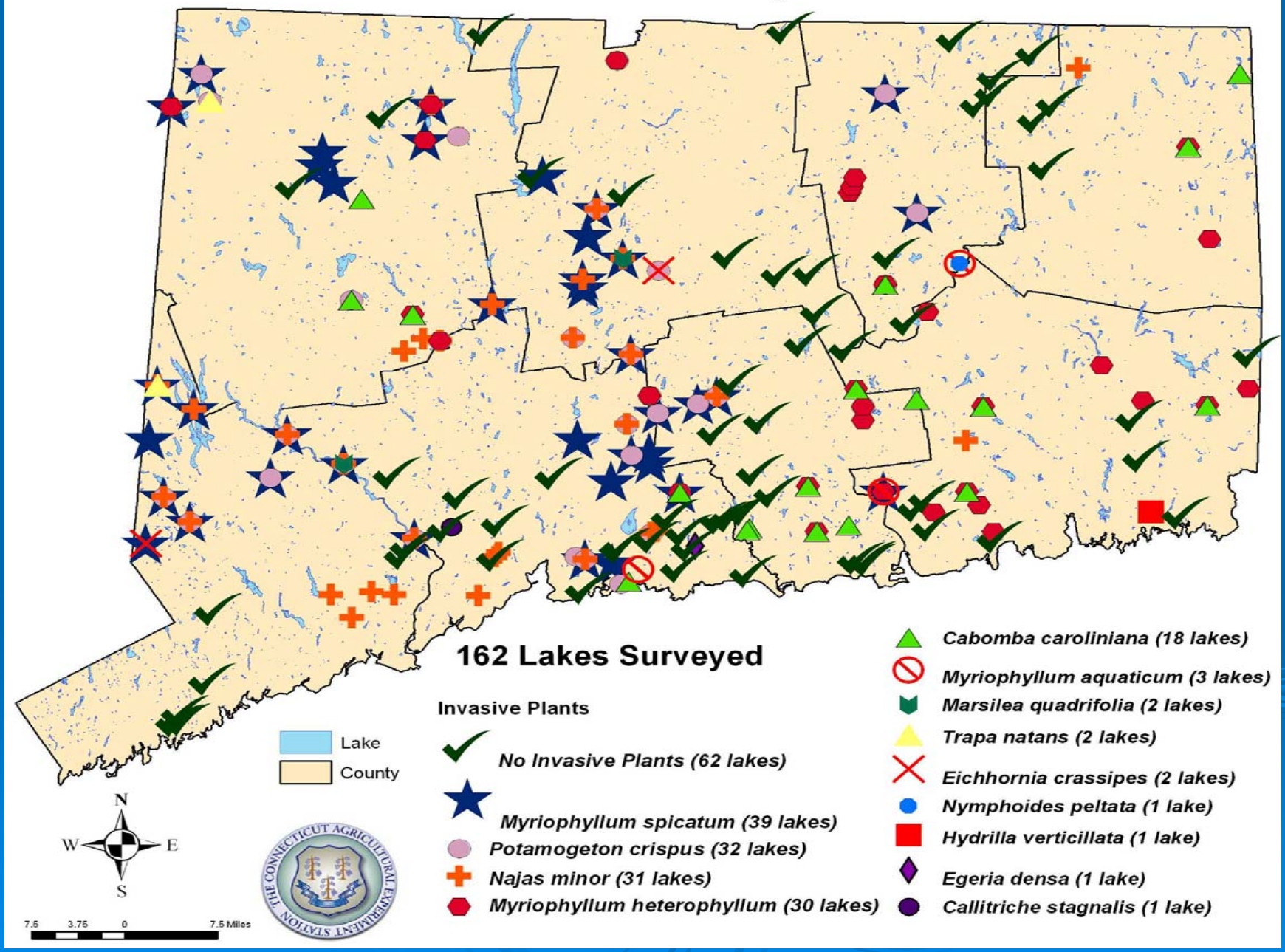
CAES IAPP
Statewide Aquatic Plant Surveys



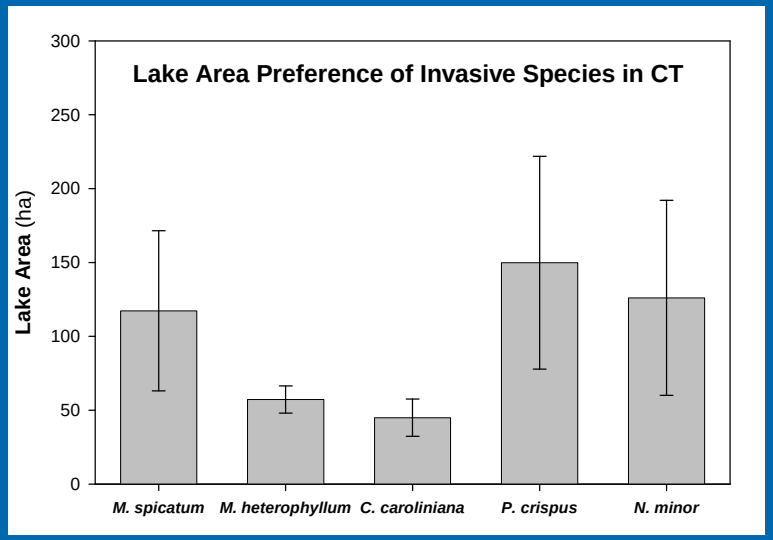


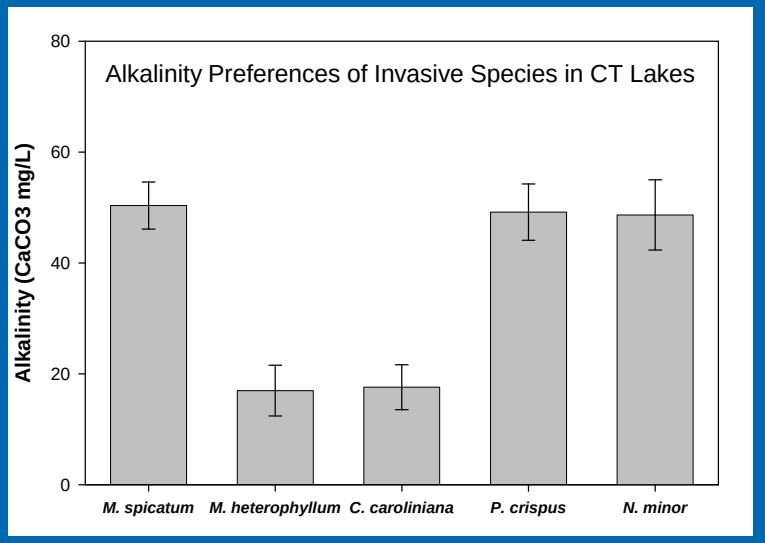
www.ct.gov/caes/iapp

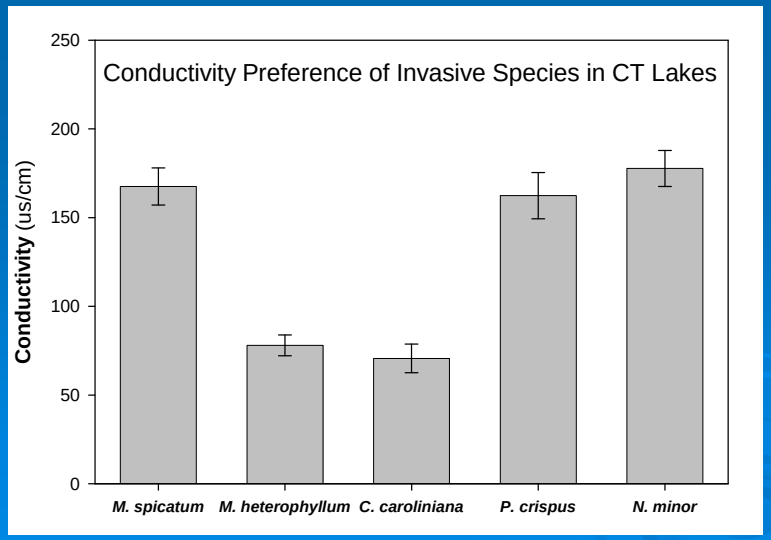
Locations of Invasive Plants Found by CAES IAPP 2004-2009

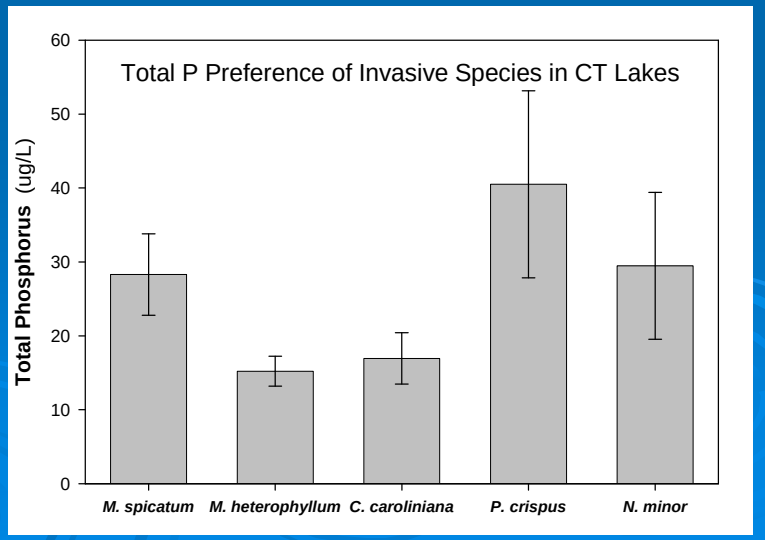


Invasive Plant Correlations







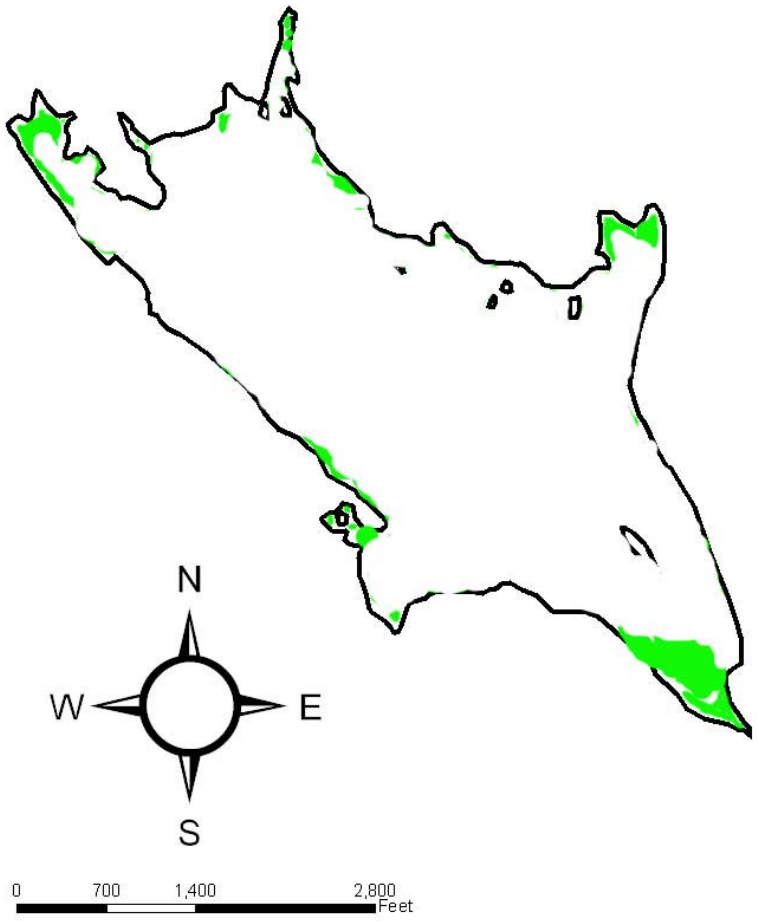


Variable Water Milfoil
Myriophyllum heterophyllum

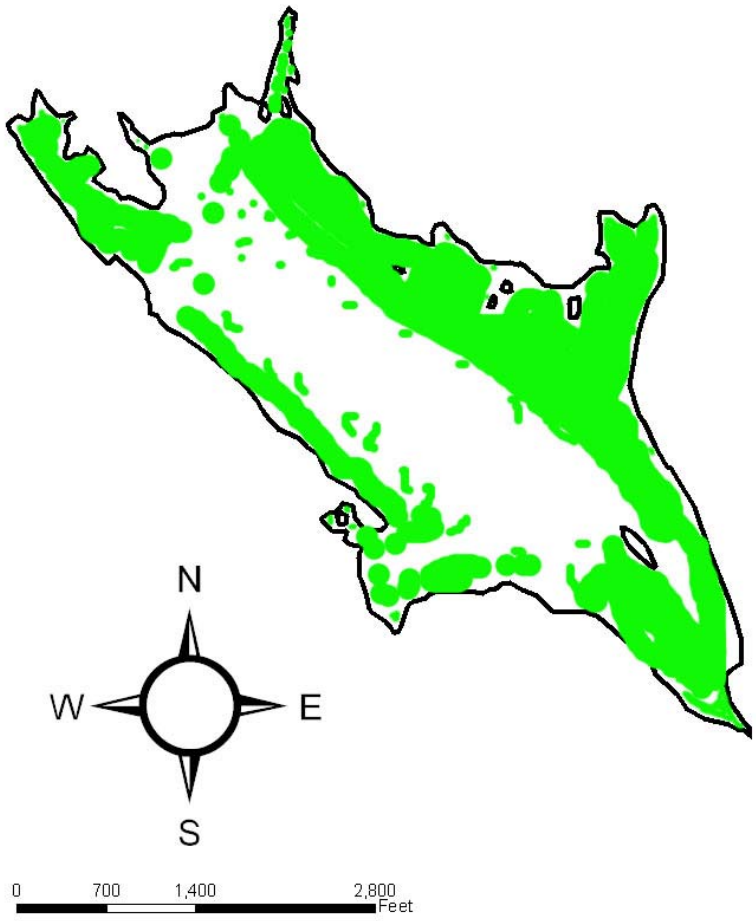
- Goals
  - Find methods for selective removal
  - Enhance native plants species
  - Assure public safety

CAES IAPP

Bashan Lake
Areas of Variable MIlfoil
CAES Survey 1999

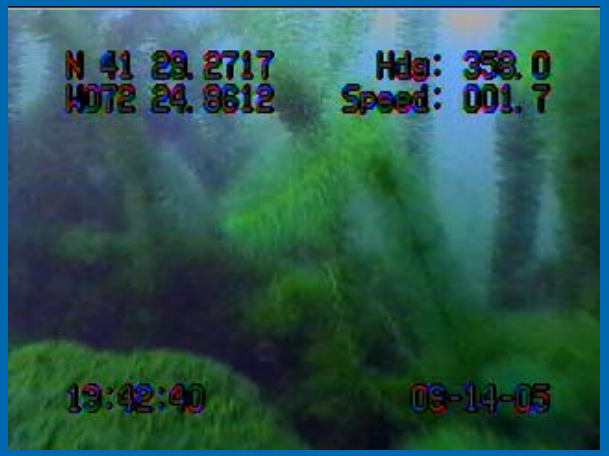


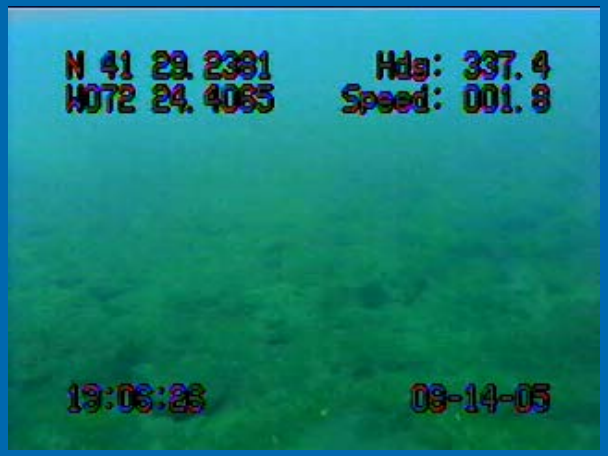
Bashan Lake
Areas of Variable MIlfoil
CAES Surveys 1999 - 2006

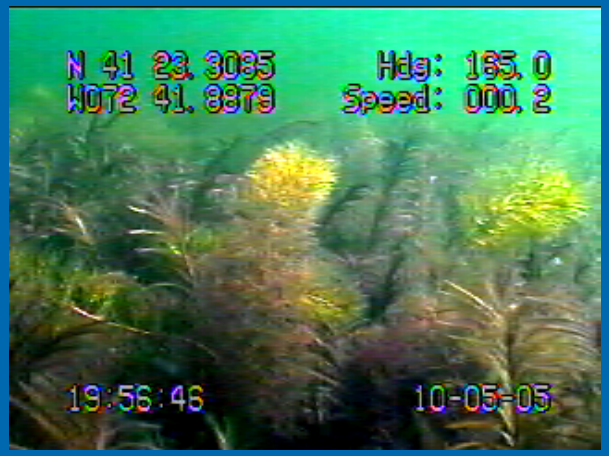


Surveillance

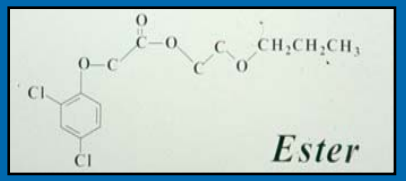
Underwater Pictures







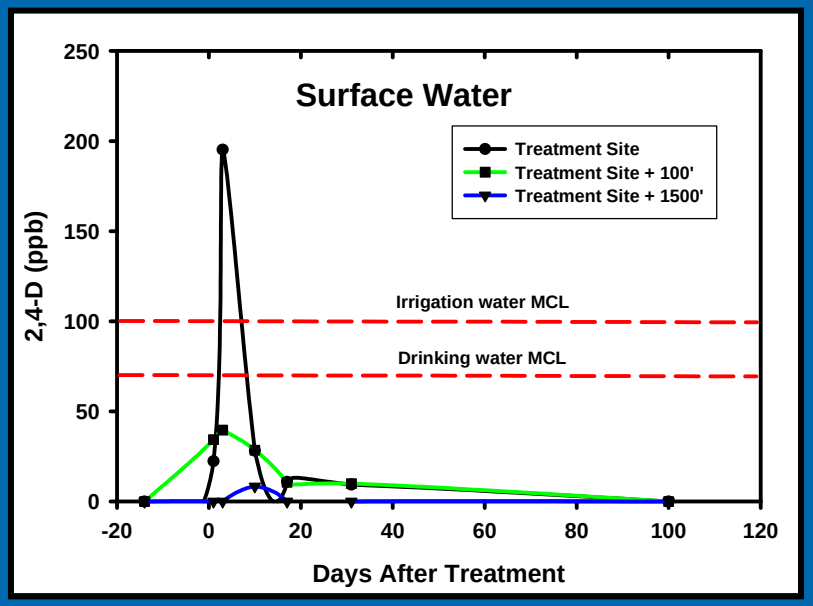
2, 4-D
Navigate, Aquacide

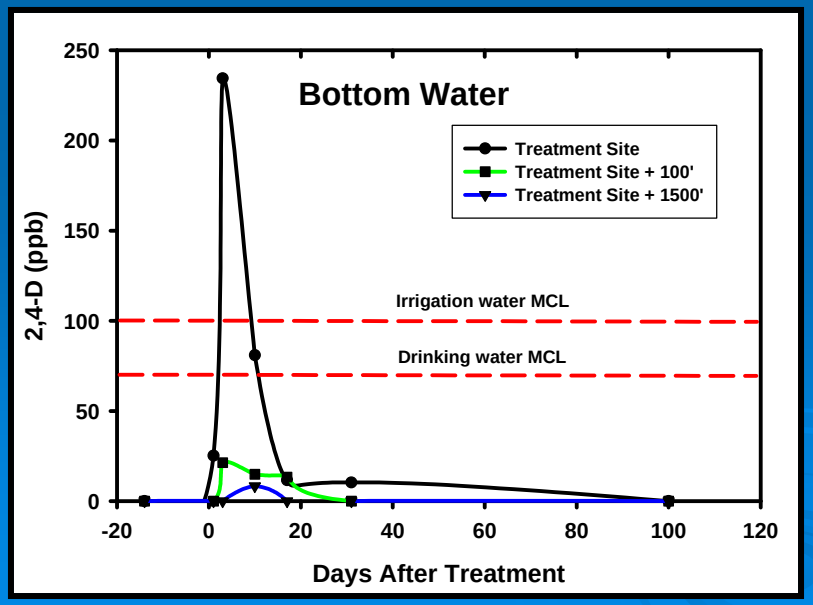


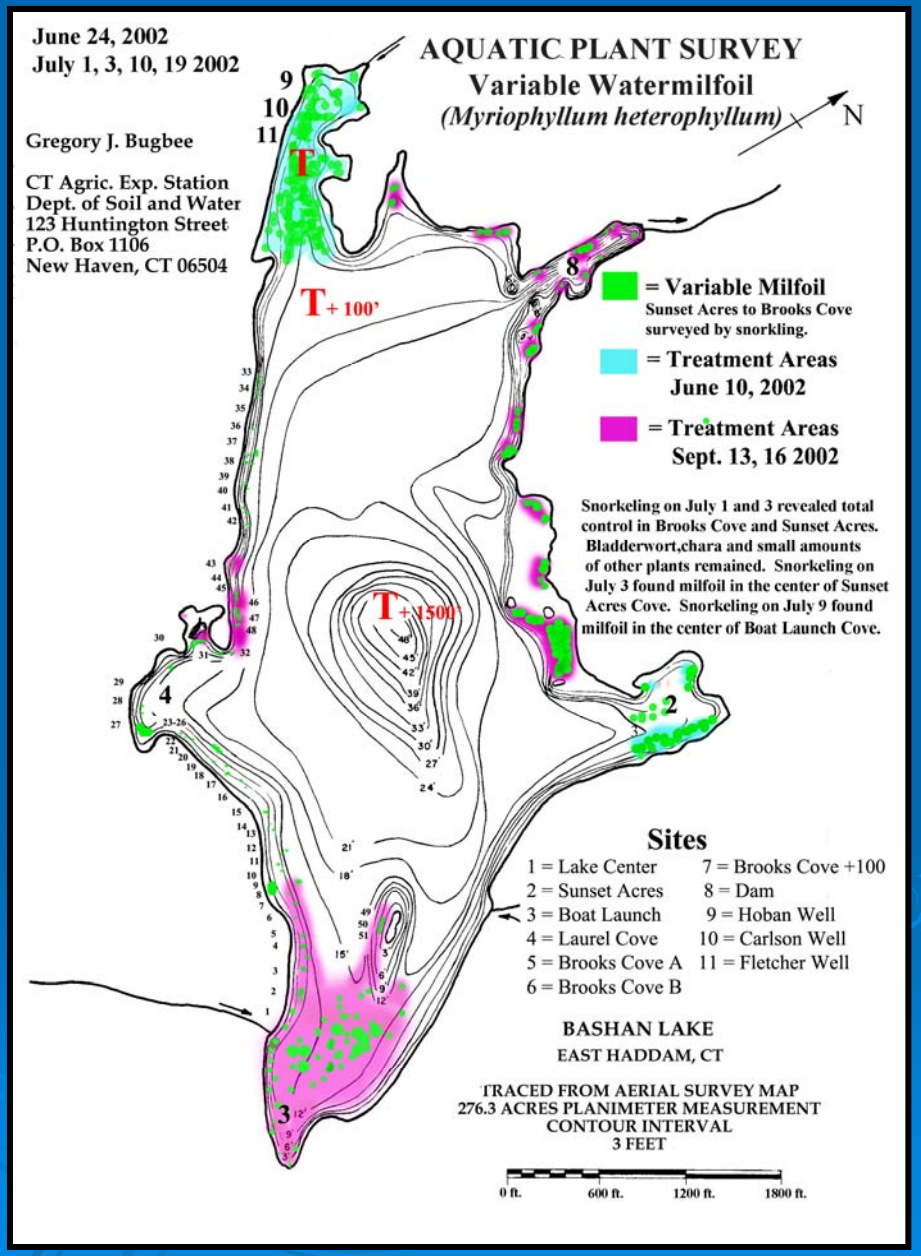
- Aquatic and Terrestrial Herbicide
- Selective to broadleaf plants
- Systemic

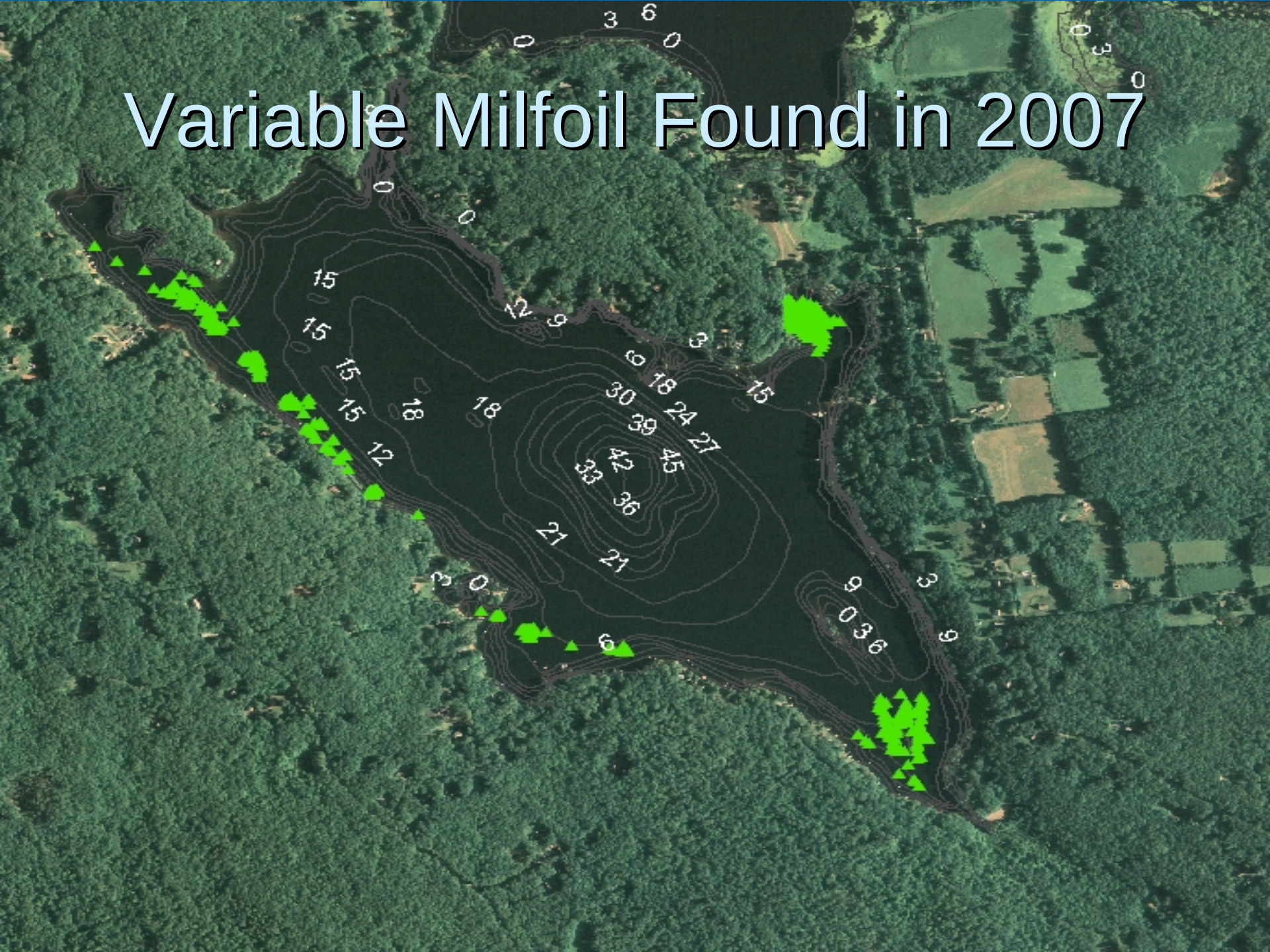
- Half life (water) 5-50 days
- USEPA MCL
  - 60 ppb – drinking
  - 100 ppb - irrigation

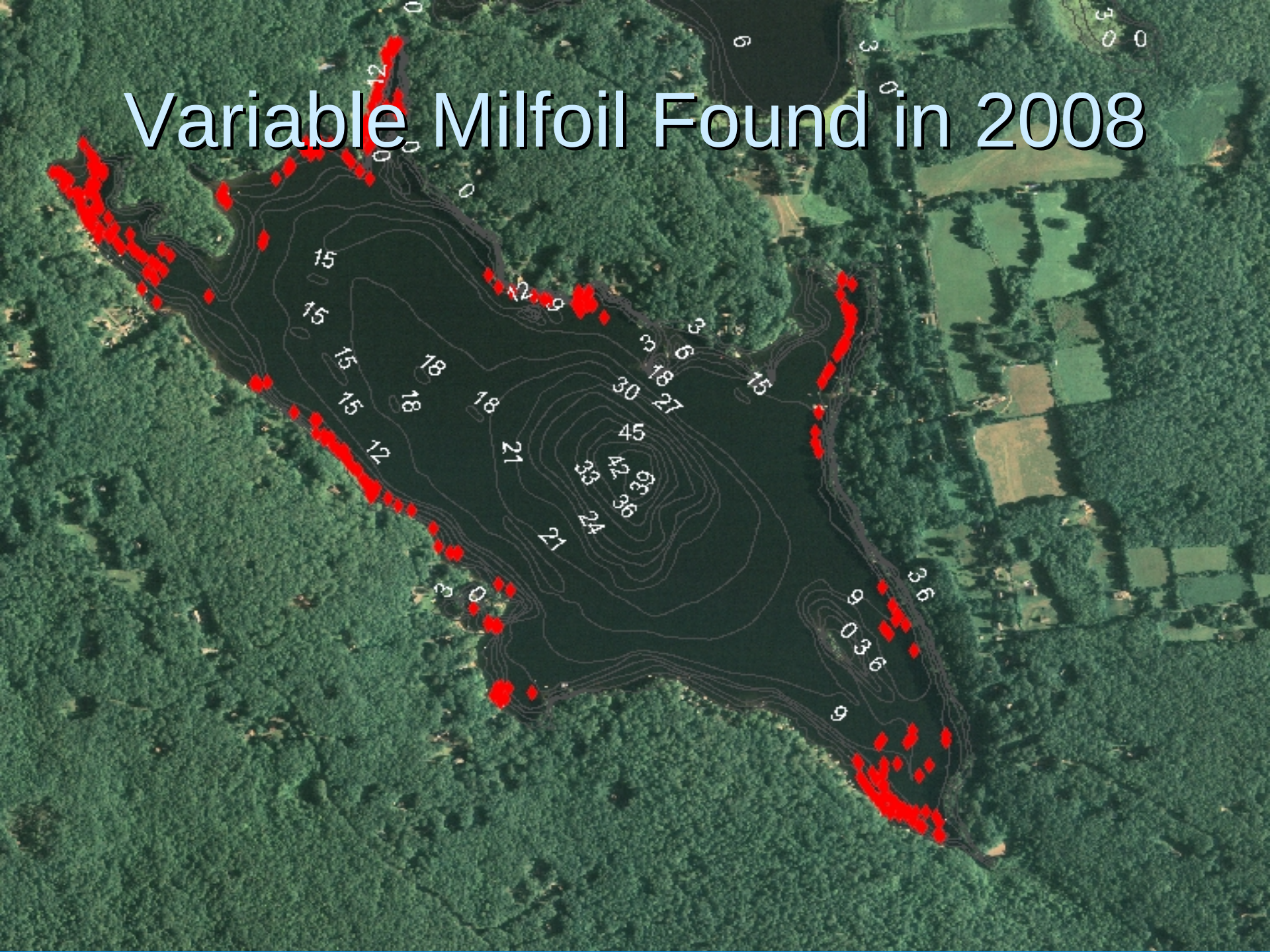
Persistence and Movement of 2,4-D



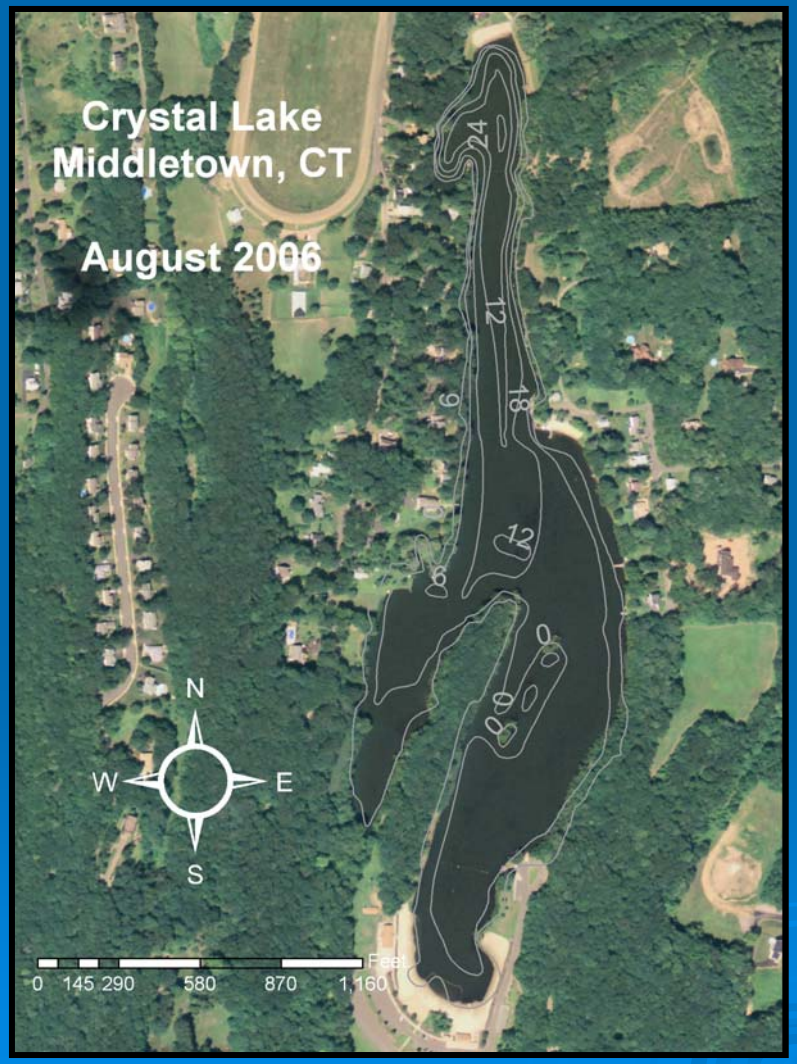





Variable Milfoil Found in 2007


Variable Milfoil Found in 2008

Use of Early Season Herbicide to Control Curly Leaf Pondweed and Eurasian Water Milfoil



- **Crystal Lake**
- **Middletown, CT**
- **32 Acres**
- **Maximum Depth = 20 feet**
- **Mean Depth = 8 feet**

Curly Leaf Pondweed

grows in the fall and spring sets reproductive structures called turions then dies back during the summer

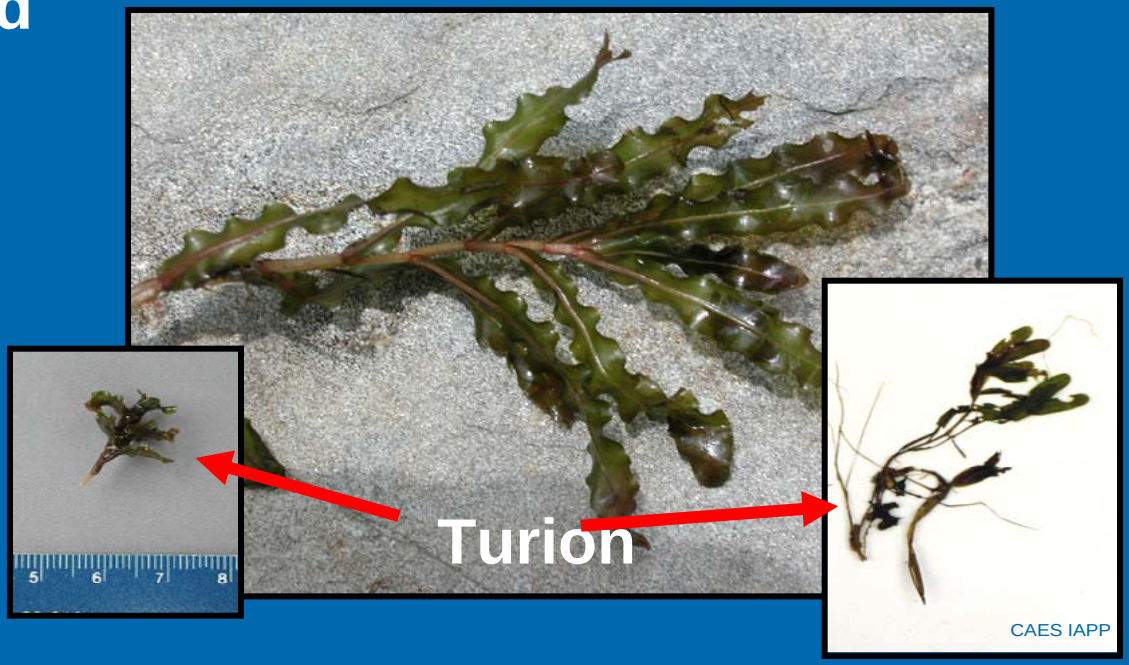


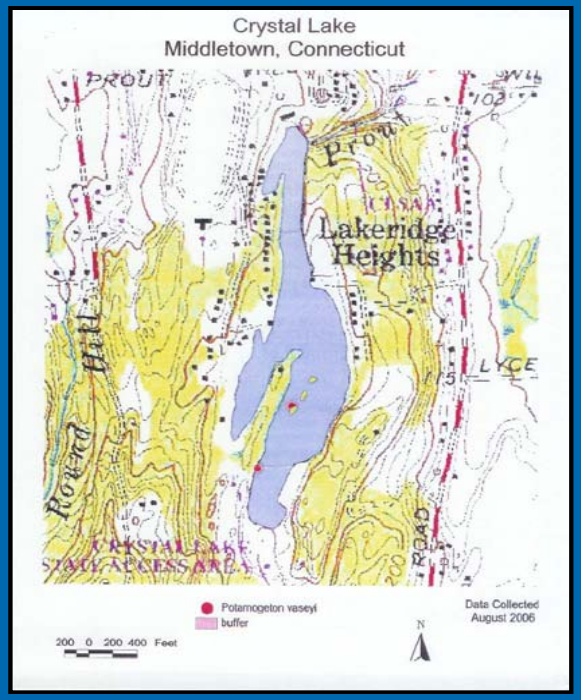
Table 1. Presence (Y) or absence (N) of turions on *Potamogeton crispus* prior to treatment.

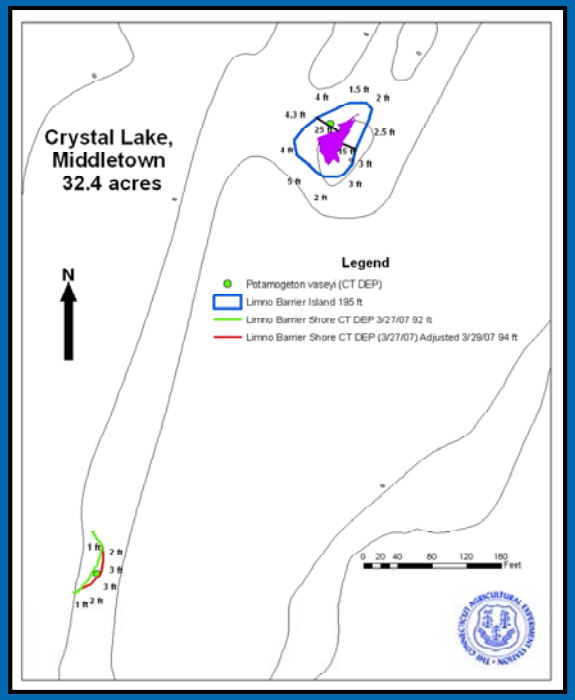
	Site 1				Site 2				Site 3				Site 4			
Rep #	Length* (cm)	Turions old	Turions new	rhizome	Length* (cm)	Turions old	Turions new	rhizome	Length* (cm)	Turions old	Turions new	rhizome	Length* (cm)	Turions old	Turions new	rhizome
1	60	N	N	Y	40	Y	N	Y	35	Y	N	Y	70	Y	N	Y
2	55	N	N	Y	80	N	N	Y	30	Y	N	Y	68	Y	N	Y
3	50	N	N	Y	50	N	N	Y	25	N	N	N	25	Y	N	Y
4	45	N	N	Y	30	N	N	Y	15	N	N	N	70	N	N	Y
5	40	N	N	Y	45	N	N	N	30	N	N	Y	70	N	N	Y
6	40	N	N	Y	30	N	N	Y	28	N	N	Y	50	N	N	Y
7	65	N	N	Y	33	N	N	Y	28	N	N	Y	85	Y	N	Y
8	50	N	N	Y	40	N	N	Y	15	N	N	Y	40	Y	N	Y
9	65	N	N	Y	50	Y	N	Y	16	Y	N	Y	95	Y	N	Y

* Stem length

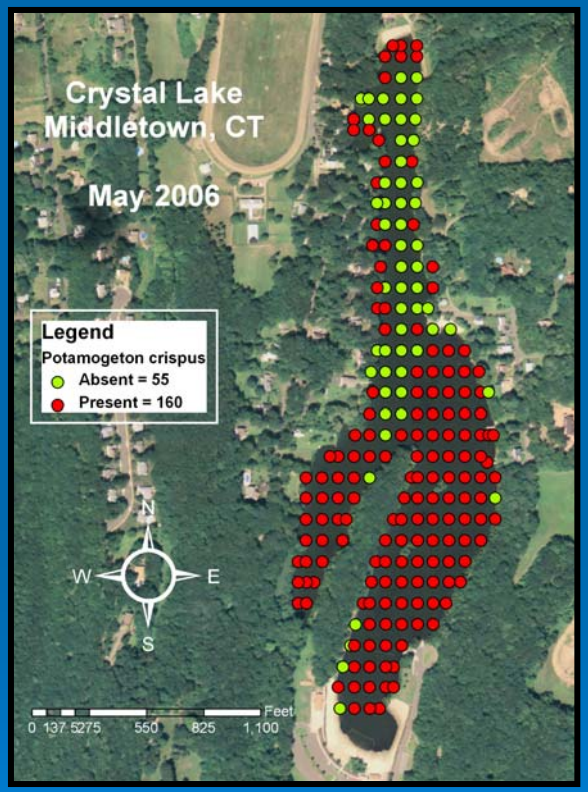
Installation of Limnobarriers to Protect Endangered Plant

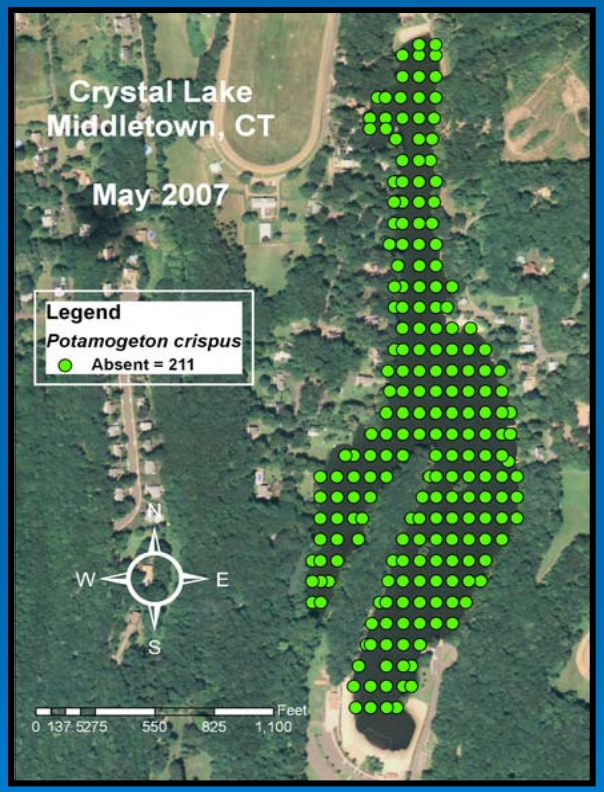
(Potamogeton vaseyi)

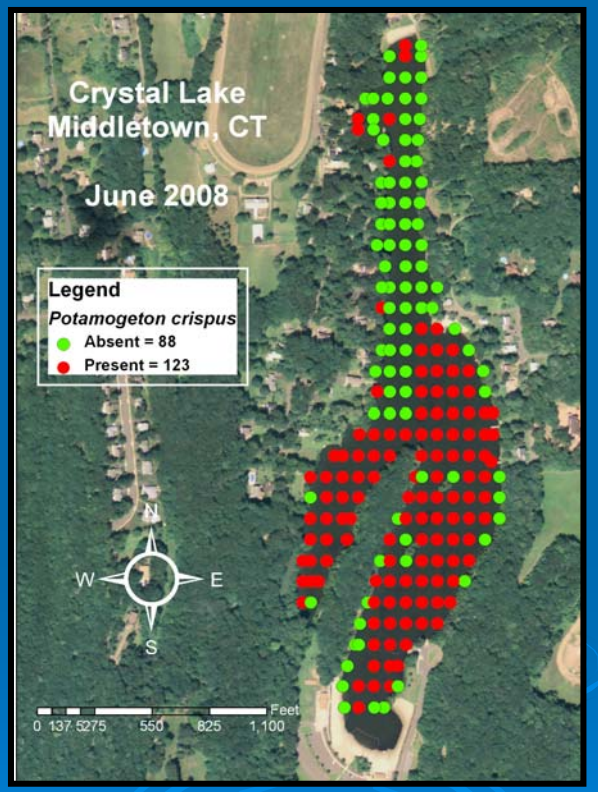




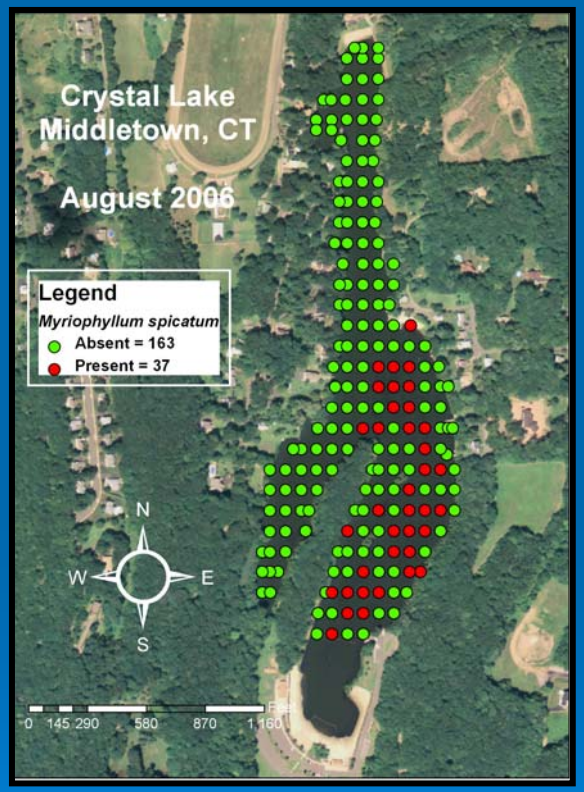
Effectiveness of Early Season Diquat Application on Curly Leaf Pondweed

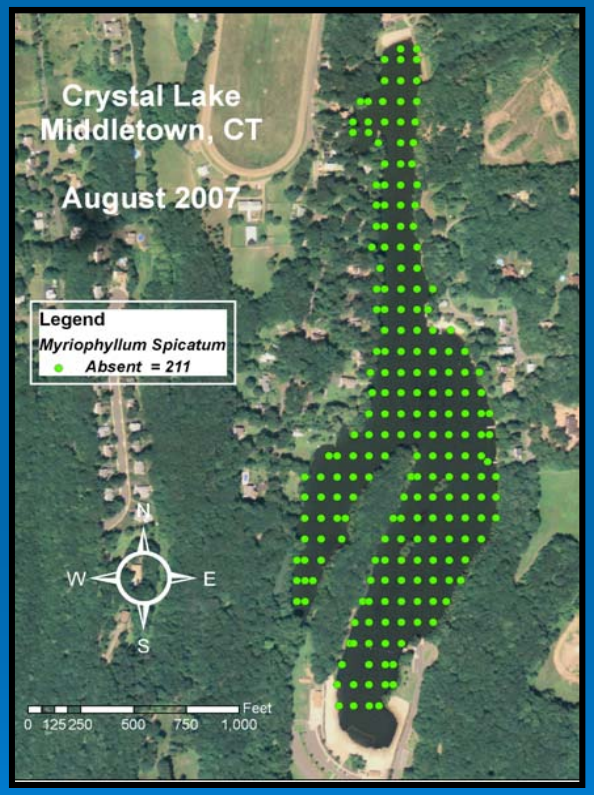


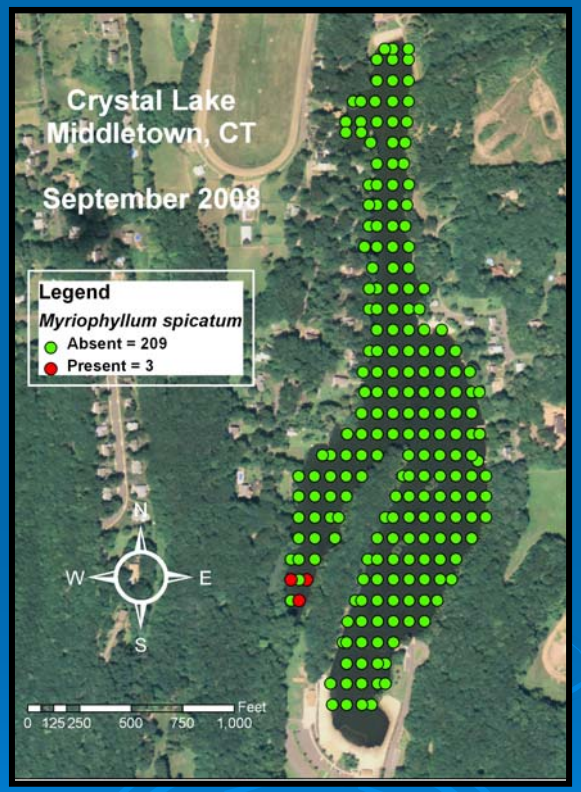




Effectiveness of Early Season Diquat Application on Eurasian Water Milfoil





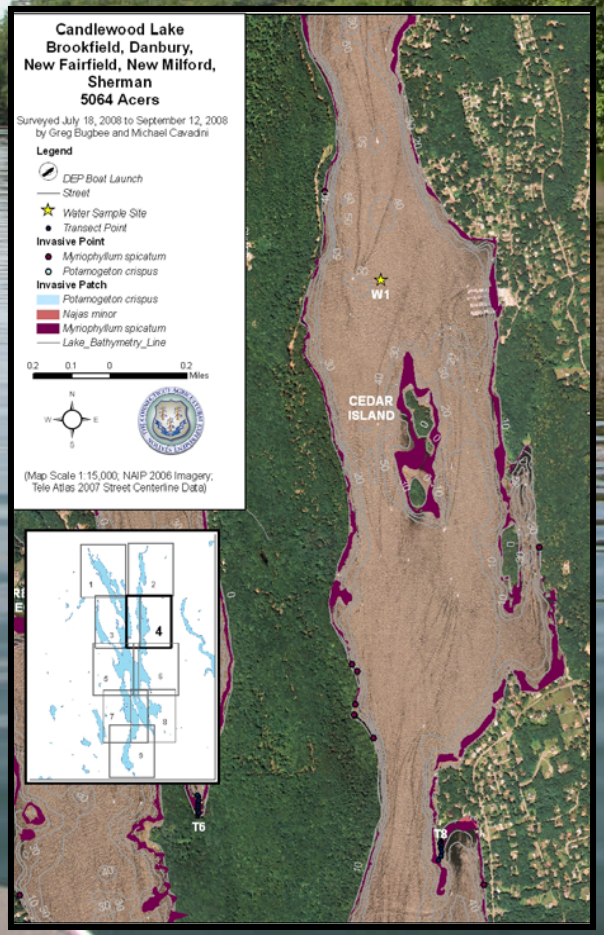


Frequency of Occurrence All Plants Species Found in Crystal Lake From 2006 - 2008

Scientific Name	Common Name	Frequency (mean dry wt)					
		Spring			Summer		
		2006	2007	2008	2006	2007	2008
Ceratophyllum demersum	Coontail	10(0.9)	16(3.6)	19(0.7)	46(4.8)	38(3.3)	102(11.8)
Eleocharis acicularis	Spikerush	0	0	0	0	0	5(2.1)
Elodea nuttallii	Waterweed	5(2.4)	1(0.3)	0	5(0.8)	1(2.0)	11(5.3)
Gratiola aurea	Golden hedge-hyssop	3(0.5)	1(2.0)	0	2(0.5)	3(0.3)	3(0.4)
*Isoetes sp.***	Quillwort	0	0	0	0	0	0
*Ludwigia palustrus***	Marsh primrose-willow	0	0	0	0	0	0
*Myriophyllum spicatum**	Eurasian watermilfoil	24(1.3)	0	0	37(3.6)	0	3(7.8)
Najas flexilis	Nodding waternymph	0	0	1(0.6)	11(6.9)	6(1.4)	2(0.9)
*Najas minor**	Brittle waternymph	0	0	0	4(1.0)	14(2.9)	43(2.6)
*Nymphaea odorata***	White water lily	0	0	0	0	0	0
Potamogeton bicupulatus	Snailseed pondweed	0	0	2	0	2(3)	0
*Potamogeton crispus**	Curly leaf pondweed	160(7.6)	0	123(19.3)	9(1.2)	27(0.6)	106(7.1)
*Potamogeton gramineus***	Variable leaf pondweed	0	0	0	0	0	0
Potamogeton pusillus	Small Pondweed	0	0	0	0	0	6(1.4)
Potamogeton robbinsii	Robins Pondweed	3(0.2)	6 (5.7)	4 (0.4)	3(4.1)	24(2.0)	43(7.8)
*Potamogeton vaseyi****	Vasey's pondweed	0	0	0	0	0	0
Stuckinia pectinatus	Sago pondweed	0	0	2(4.4)	0	0	0

*Invasive plant
**Not found on georeferenced grid but observed in lake by CAES
***Not found on georeferenced grid but observed in lake by CTDEP.

Mapping Invasive Plants in Candlewood Lake



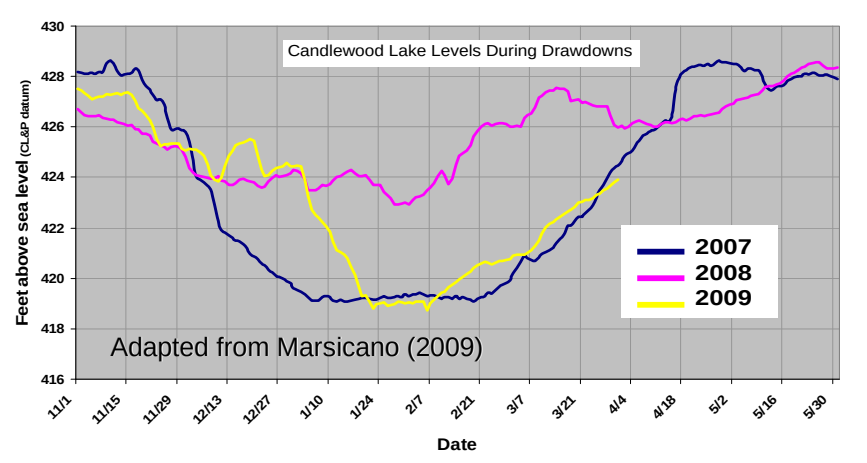
- Connecticut's largest lake
  - **5086 Acres**
  - **62 miles of shoreline**
  - **Used for hydro-generation of electricity**
- Three invasive species
  - **Eurasian water milfoil**
  - **Minor naiad**
  - **Curly leaf pondweed**
- Managed by drawdown

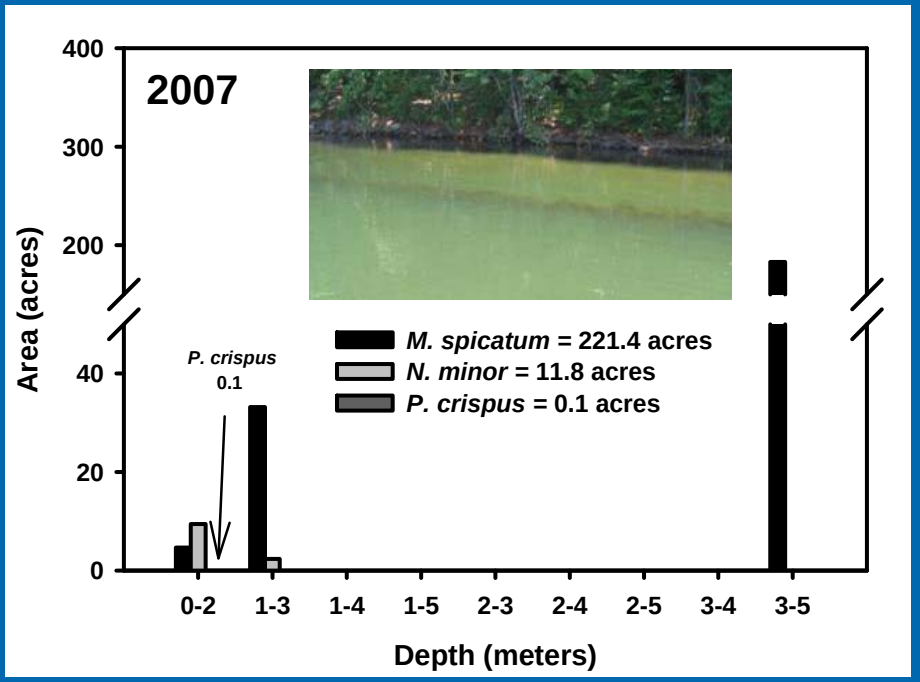
What Makes a Drawdown Successful?

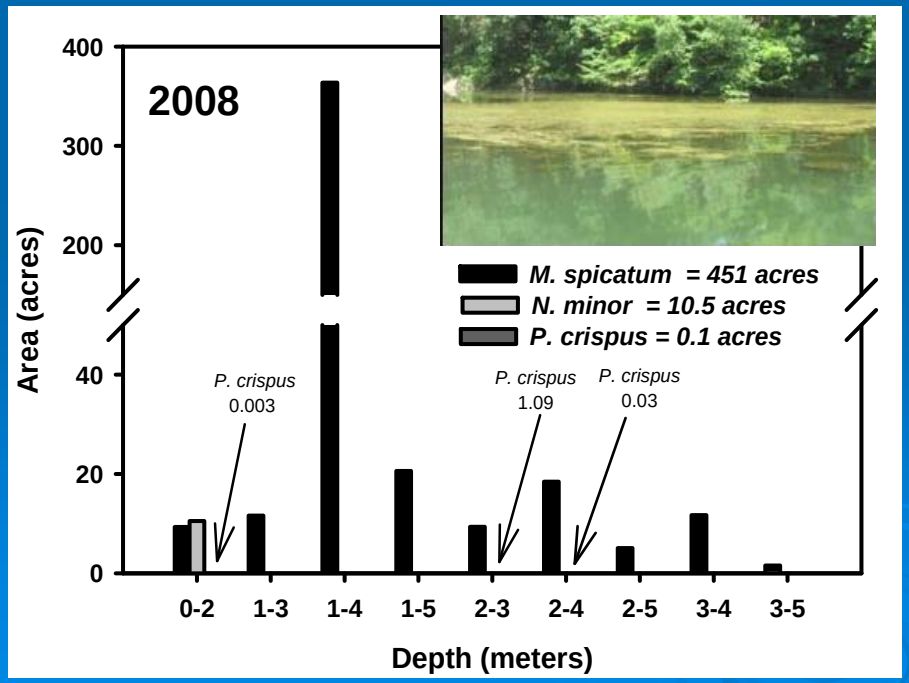
- Temperature
  - Air
  - Sediment
  - Vegetation

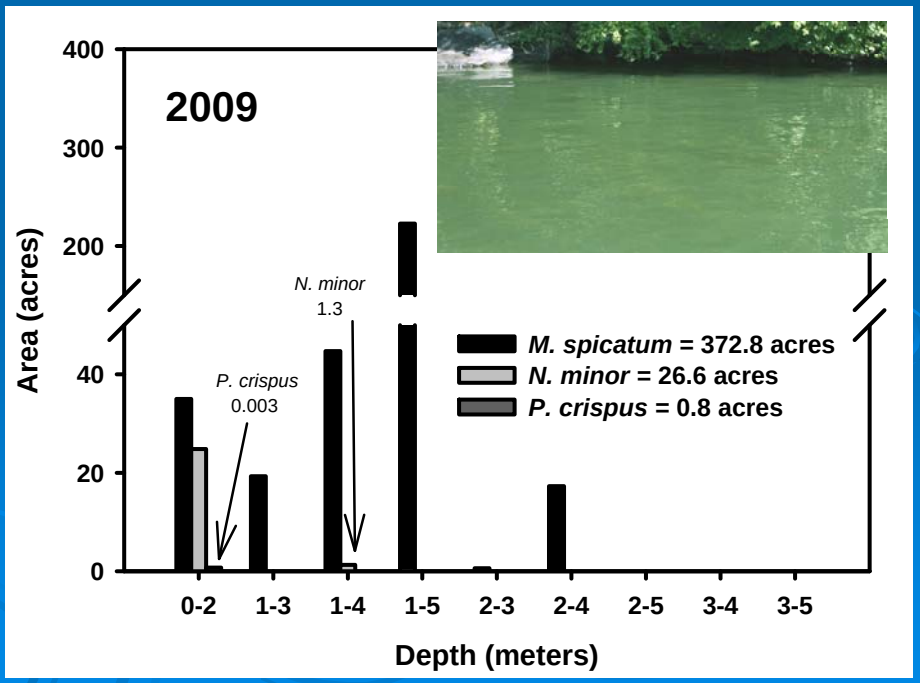
- Duration
- Drying
- Freezing
- Snow, ice cover etc.

Results


Candlewood Lake Levels During Drawdowns
Feet above sea level (CL&P datum)
430
428
426
424
422
420
418
416
11/1
11/15
11/29
12/13
12/27
1/10
1/24
2/7
2/21
3/7
3/21
4/4
4/18
5/2
5/16
5/30
Date
2007
2008
2009
Adapted from Marsicano (2009)


2007
Area (acres)
400
300
200
40
20
0
P. crispus
0.1
M. spicatum = 221.4 acres
N. minor = 11.8 acres
P. crispus = 0.1 acres
0-2
1-3
1-4
1-5
2-3
2-4
2-5
3-4
3-5
Depth (meters)


2008
Area (acres)
400
300
200
40
20
0
M. spicatum = 451 acres
N. minor = 10.5 acres
P. crispus = 0.1 acres
P. crispus
0.003
P. crispus
1.09
P. crispus
0.03
0-2
1-3
1-4
1-5
2-3
2-4
2-5
3-4
3-5
Depth (meters)


2009
Area (acres)
400
300
200
40
20
0
N. minor
1.3
P. crispus
0.003
M. spicatum = 372.8 acres
N. minor = 26.6 acres
P. crispus = 0.8 acres
0-2
1-3
1-4
1-5
2-3
2-4
2-5
3-4
3-5
Depth (meters)

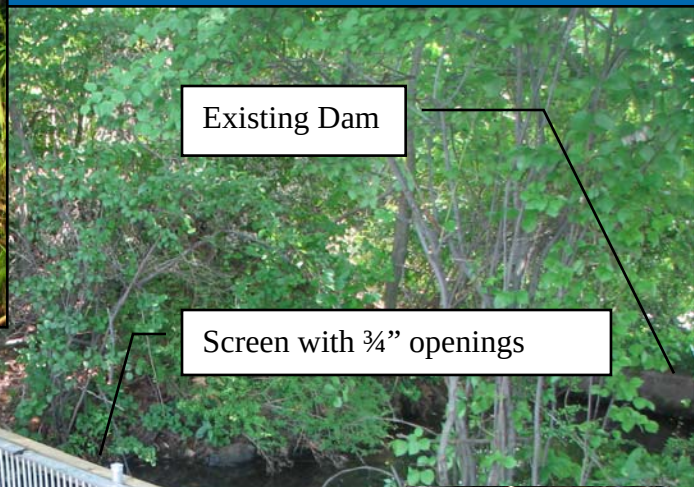
Grass Carp

(*Ctenopharyngodon idella*)

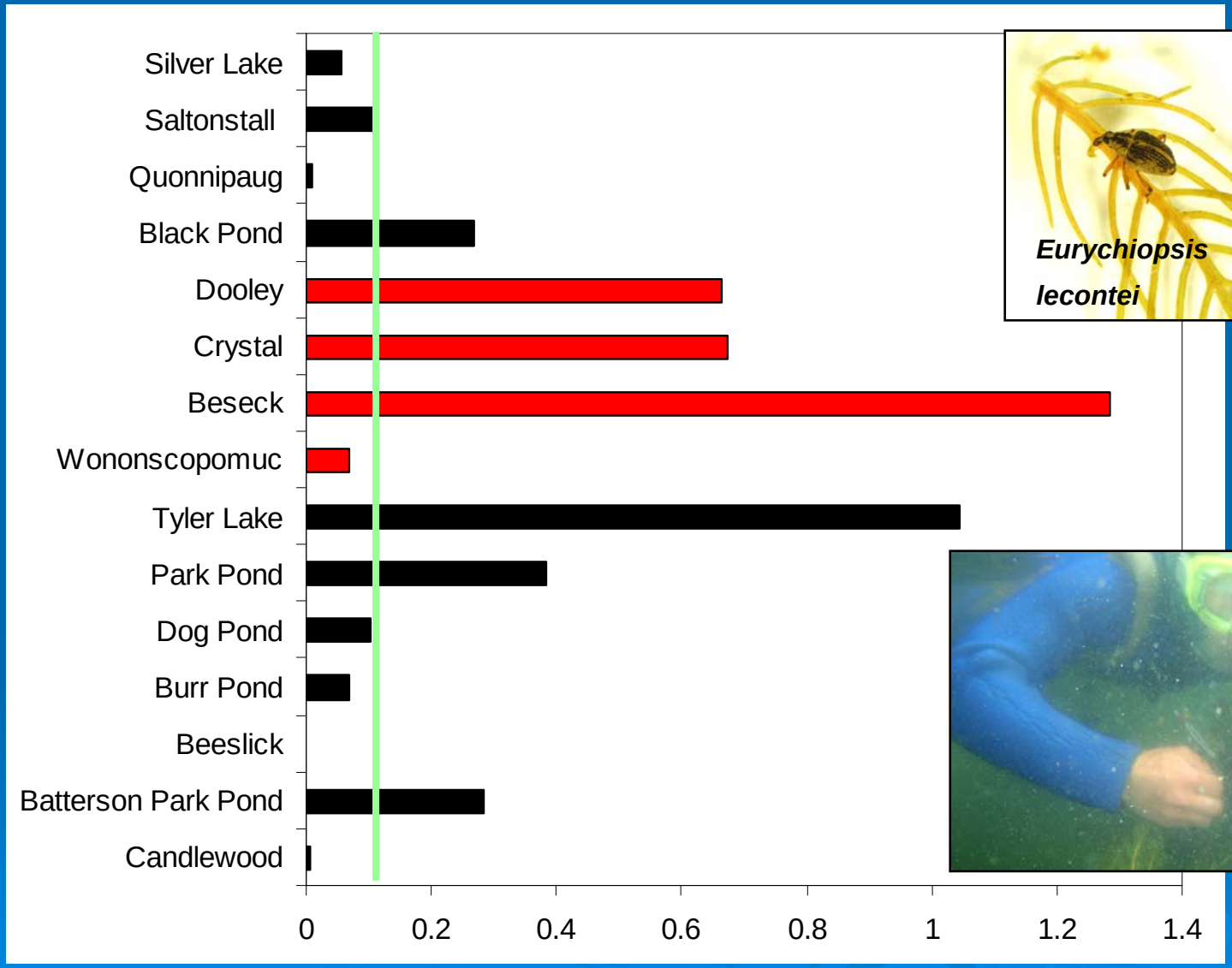
20 acres

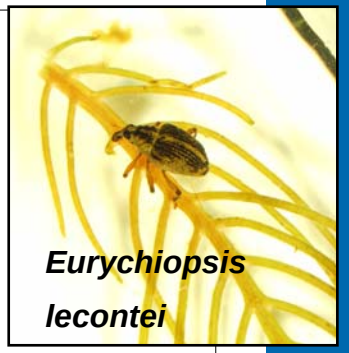
Grannis Lake

East Haven CT



Milfoil Weevils Per Stem





Eurychiopsis lecontei

Questions?

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