Surveillance and Management of Invasive Aquatic Plants

Connecticut Agricultural Experiment Station

Invasive Aquatic Plant Program (www.ct.gov/caes/iapp)

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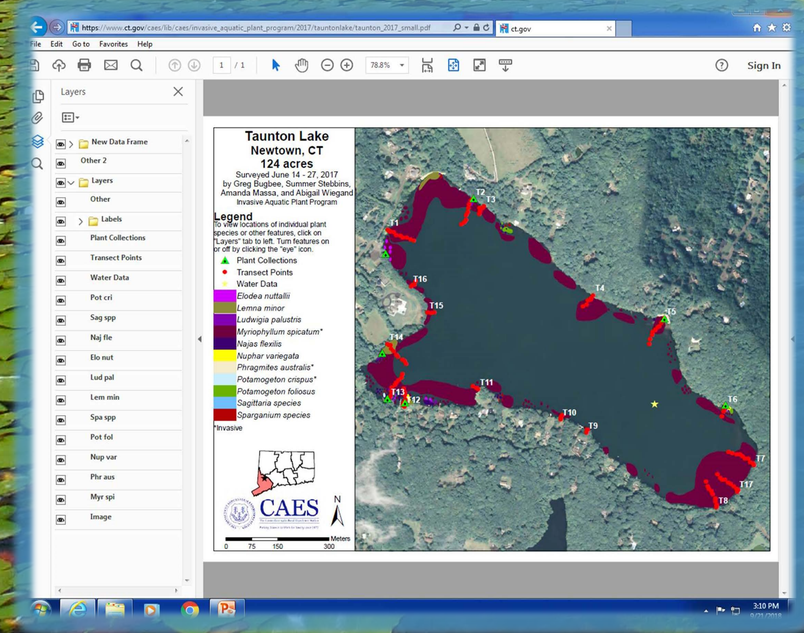
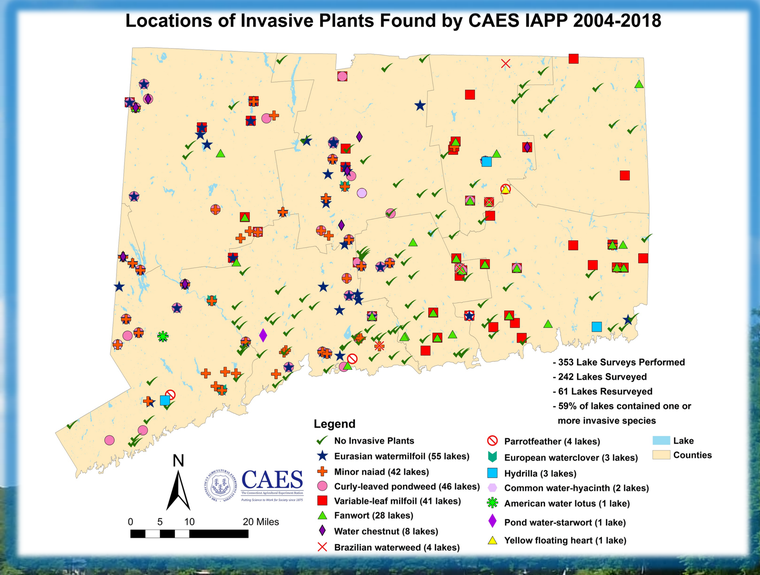
Background

Connecticut's lakes and ponds face an imminent threat from non-native invasive plants. Dense stands of invasive aquatic plants interfere with recreation, lower property values, and may reduce native species richness and diversity. Introduced plants such as Eurasian watermilfoil (*Myriophyllum spicatum*), variable watermilfoil (*Myriophyllum heterophyllum*), fanwort (*Cabomba caroliniana*), curly leaf pondweed (*Potamogeton crispus*), and minor naiad (*Najas minor*) are now well established and of great concern. Newer arrivals such as Brazilian waterweed (*Egeria densa*), hydrilla (*Hydrilla verticillata*), parrot feather (*Myriophyllum aquaticum*), and water chestnut (*Trapa natans*) are now established and posed to become destructive. Since 2004, the Invasive Aquatic Plant Program (IAPP) at the Connecticut Agricultural Experiment Station (CAES) has conducted aquatic vegetation surveys in lakes and ponds around the state.

Surveillance

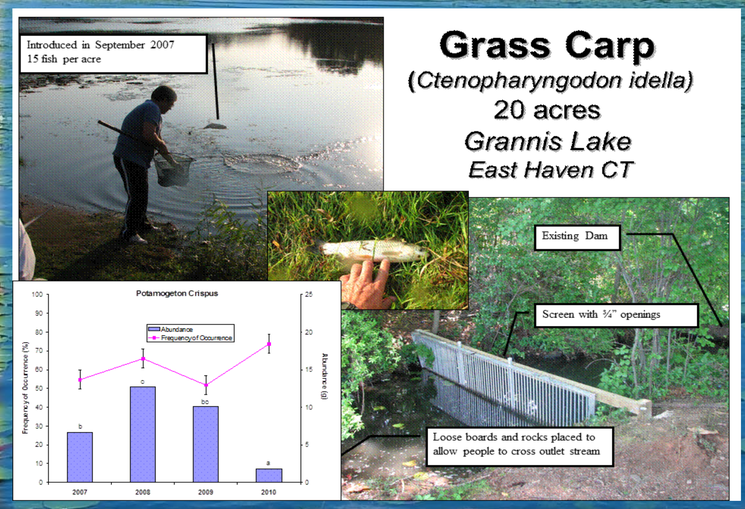
We have surveyed 242 waterbodies and documented over 100 aquatic plant species with 14 of them being invasive (see center map). Approximately sixty percent of the lakes and ponds surveyed contained one or more invasive species. In addition to a general visual survey technique, we set up georeferenced transects where detailed data on plant abundance, depth, and sediment type is recorded. These data can then be referenced in the future and changes can be quantified. Our interactive maps (below) are placed on our website (www.ct.gov/caes/iapp) where plant layers, aerial imagery, bathymetry etc. can be turned on or off . We accept survey requests on our webpage.





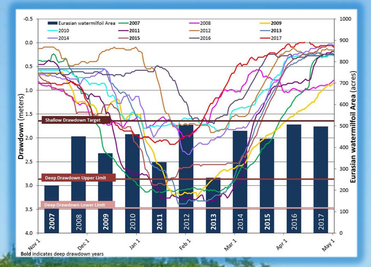
Management Studies

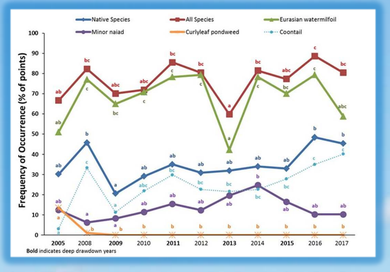
Biological Control With Grass Carp in Grannis Lake



After several unsuccessful attempts to achieve control of curly leaf pondweed and Eurasian watermilfoil with herbicides, we introduced grass carp (*Ctenopharyngodon idella*) into Grannis Lake in the Fall of 2007. Grass carp are aquatic plant herbivores that must be sterile (triploid) and accompanied by a CT DEEP permit before introduction in waters of the state. The fish are usually 10-12 inches when introduced (upper left above) and measures must be taken to assure the fish cannot exit the pond or lake (lower right above). We monitored over 200 georeferenced grid points on the lake for abundance (plant weight per point) and frequency of occurrence (percent of the grid points with the plant) each year. In 2008, abundance and frequency of occurrence of curly leaf pondweed increased (lower left above). This was probably due to the plant recovering from previous herbicide treatments. By 2010, however, the abundance declined abruptly while the frequency of occurrence increased. In fact, the curly leaf pondweed was rarely visible from the surface and was no longer considered a nuisance. This result was likely because the grass carp are grazing the top portions of the plant and thus reducing plant biomass. Until the basal portions are weakened to the point they cannot regenerate, frequency of occurrence will remain high.

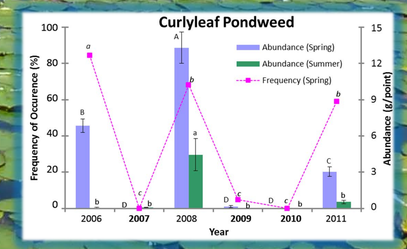
Winter Drawdown in Candlewood Lake





Candlewood Lake relies on winter drawdown to control large expanses of Eurasian watermilfoil. An alternate year deep (3 m) and shallow (1 m) drawdown regime is employed; however, there were consecutive shallow drawdowns for the last two years (2016-2017). The rapid regrowth in the shallow drawdown years is typical throughout Candlewood Lake and has become reasonably predictable. Interestingly, the Eurasian watermilfoil coverage did not increase in 2017 even though this was the second consecutive year of shallow drawdowns.

Early Season Herbicide in Crystal Lake



AQUATIC MACROPHYTES FOUND IN CRYSTAL LAKE ON GEOREFERENCED POINTS
(X = UNTREATED YEARS, **X = TREATED YEARS**). **INVASIVE SPECIES IN BOLD.**

Common Name	Scientific Name	2006	2007	2008	2009	2010	2011
Curlyleaf pondweed	***Potamogeton crispus* L.**	X*		X	X		X
Eurasian watermilfoil	***Myriophyllum spicatum* L.**	X		X			
Brittle waternymph	***Najas minor* All.**	X	X	X	X	X	X
Coontail	*Ceratophyllum demersum* L.	X	X	X	X	X	X
Golden hedge-hyssop	*Gratiola aurea* Pursh	X	X	X	X	X	X
Marsh primrose-willow	*Ludwigia palustris* (L.) Elliott		X				
Needle Spikerush	*Eleocharis acicularis* (L.) Roem. & Schult		X	X	X	X	X
Robbins Pondweed	*Potamogeton robbinsii* Oakes	X	X	X	X	X	X
Slender naiad	*Najas flexilis* (Willd.) Rostk. & Schmidt	X	X	X	X	X	X
Small Pondweed	*Potamogeton pusillus* L.		X	X	X	X	X
Snailseed pondweed	*Potamogeton bicupulatus* Fernald		X		X	X	X
Waterweed	*Elodea nuttallii* (Planch.) H. St. John	X	X	X			
White water lily	*Nymphaea odorata* Aiton					X	X
Invasive Species Richness		3**	1	3	2	1	2
Native Species Richness		5	6	7	7	8	9
Total Species Richness		8	7	10	9	9	11

*Curlyleaf pondweed - spring survey, Others - summer survey.
**All years

Crystal Lake in Middletown has a problem with curlyleaf pondweed that can prevent the town beach from opening each summer (upper left above). We investigated if an April application of the contact herbicide Reward (Diquat dibromide) could offer long term control and protect native plants. The presence of a state list plant (Potamogeton vaseyi) required testing of limnobarriers for protection (upper right above). The 2007 treatment resulted 100% control but without an herbicide application in 2008 the curlyleaf pondweed grew back. Back to back herbicide applications in 2009 and 2010 reduced grow-back in 2011 (lower left above) when native species richness reached a high of 11 (lower right above). The shows early season consecutive treatments can extended curlyleaf pondweed control while encouraging native aquatic plants.