

# Hydrilla in the Connecticut River

Gregory J. Bugbee and Summer Stebbins

Invasive Aquatic Plant Program

The Connecticut Agricultural Experiment Station

*Hydrilla verticillata*  
(Hydrilla)

Photo by Judy Preston,  
CT Sea Grant

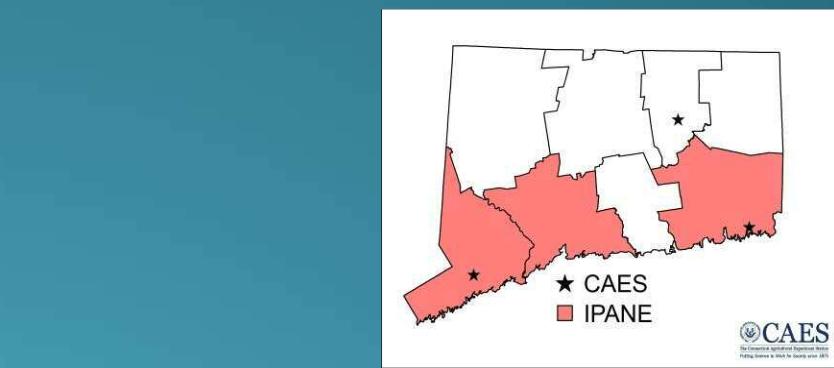
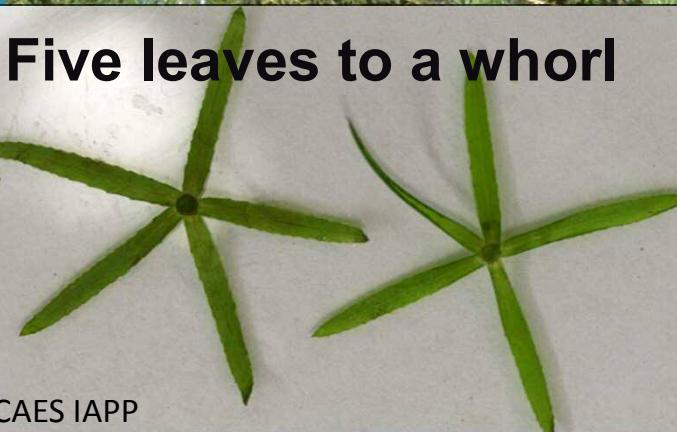
# Hydrilla

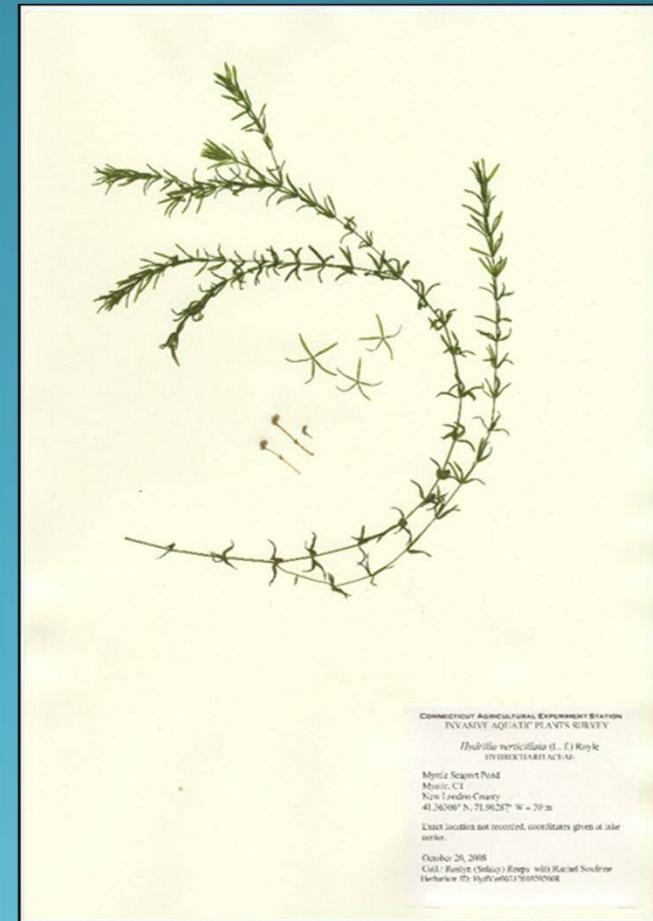
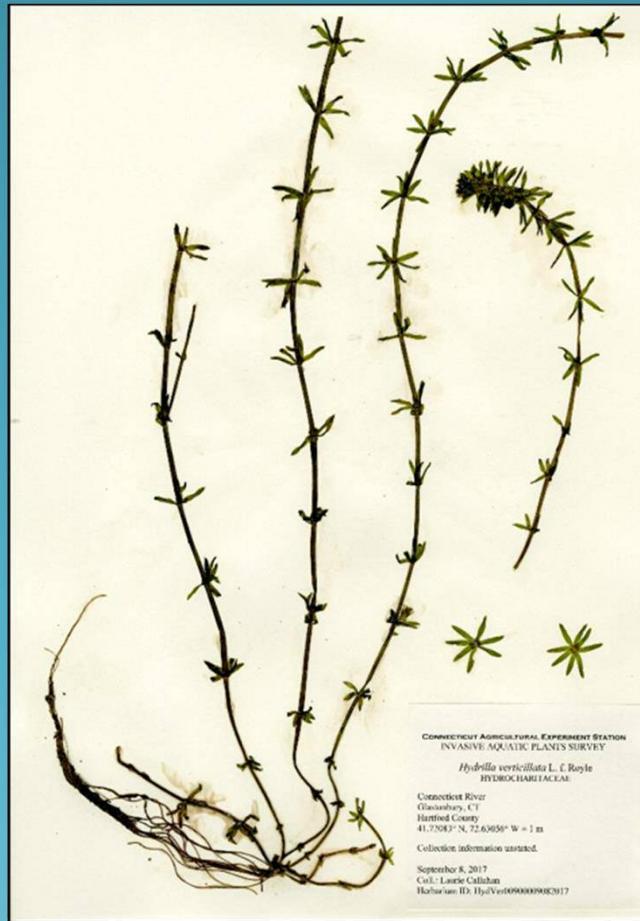
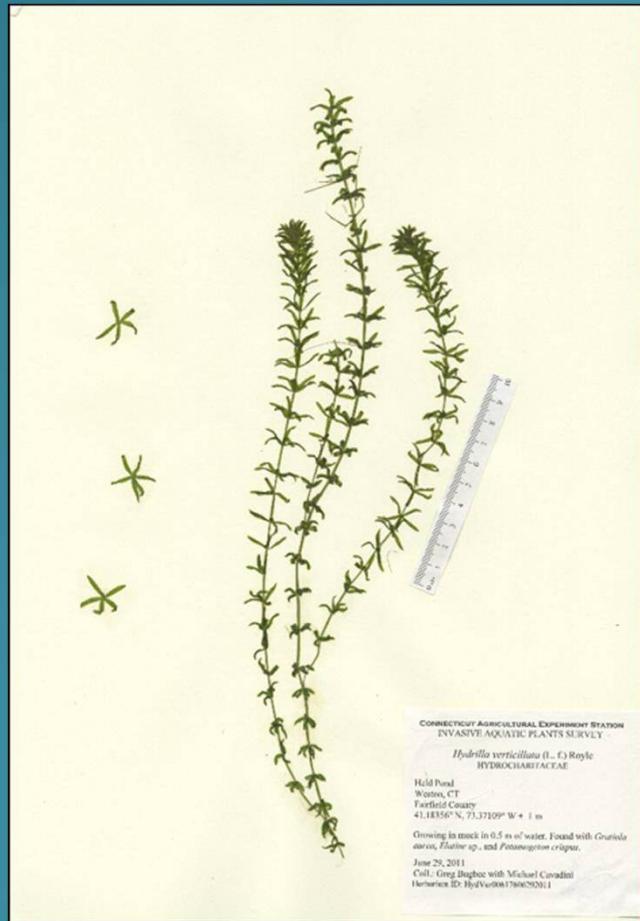
## *Hydrilla verticillata*

Laurie Callahan

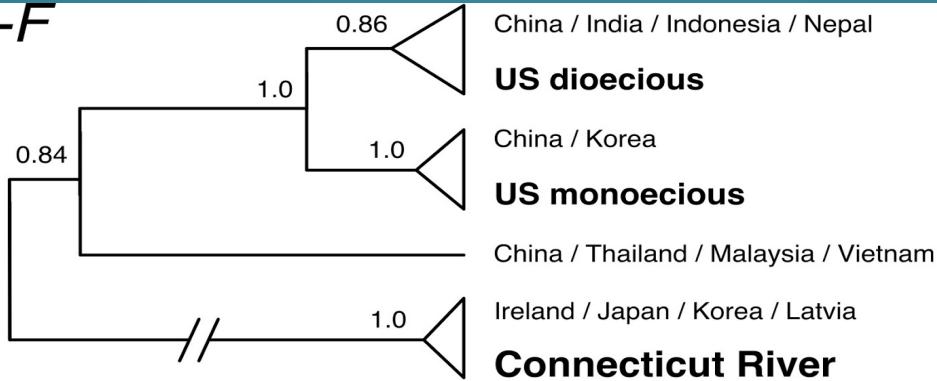


Five leaves to a whorl

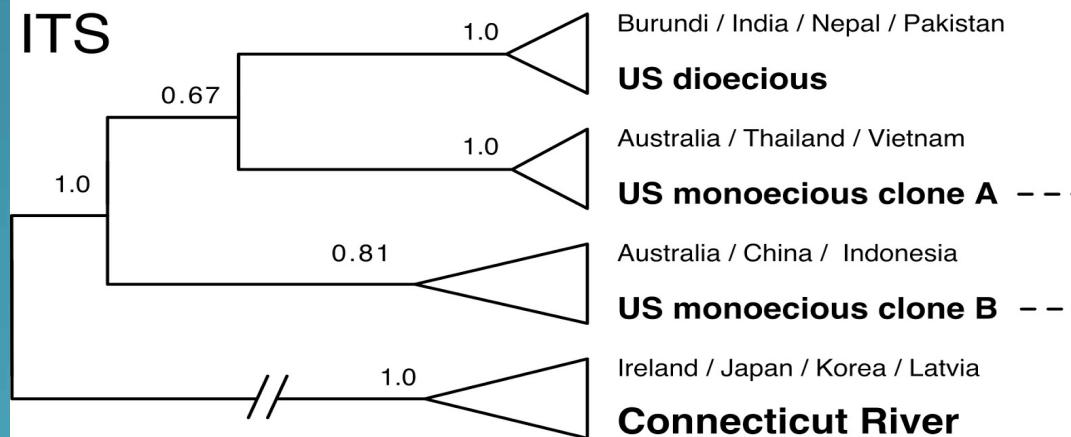




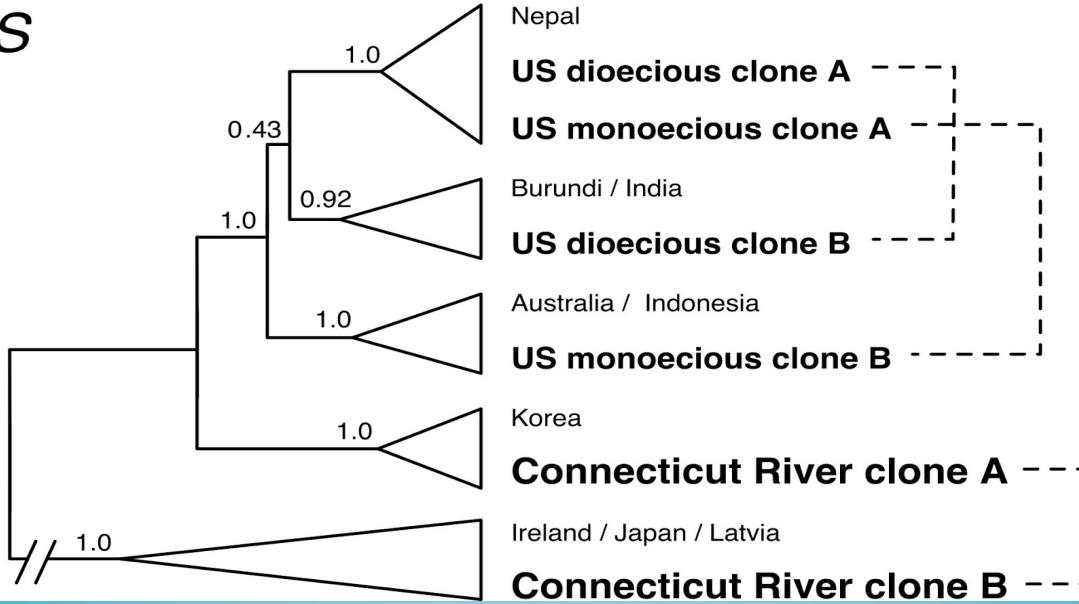
### *trnL-F*



### ITS



### *PDS*



# Hydrilla Survey Connecticut River

Fall 2018 Surveys

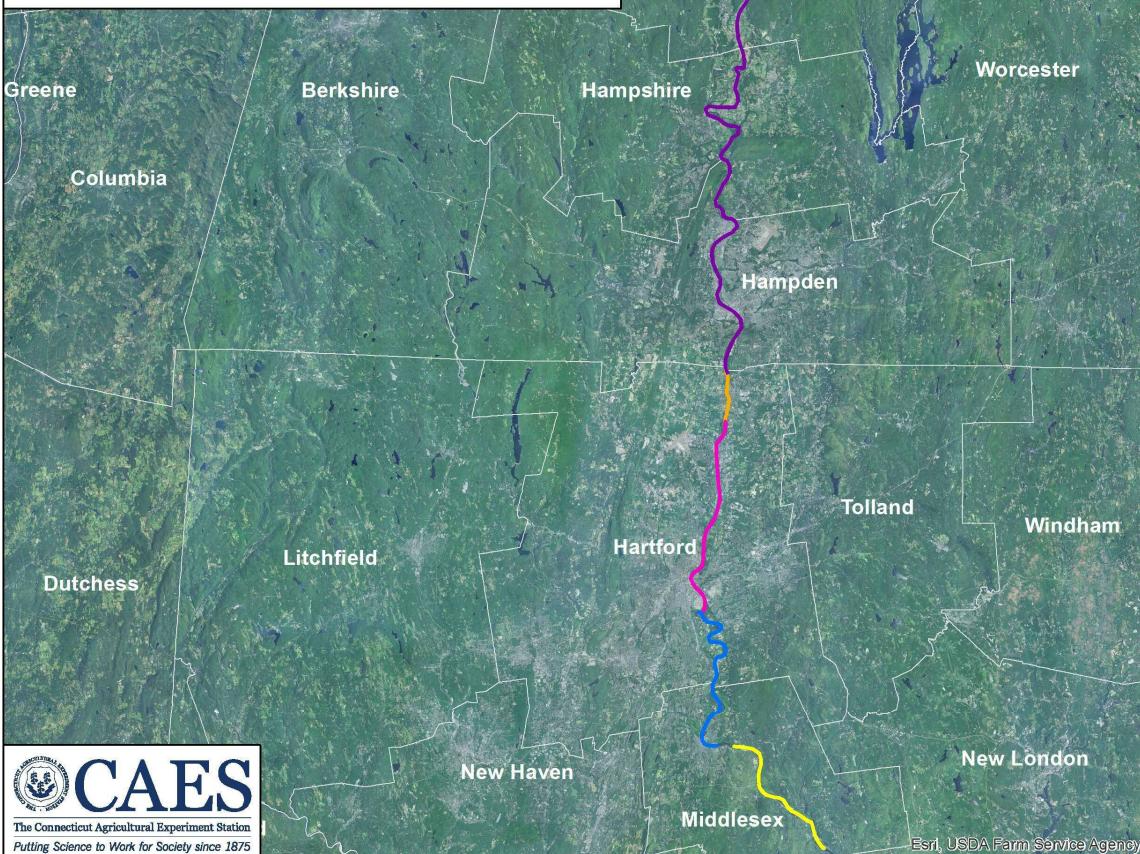
## Surveyor

- Red line: Amy Smagula, NHDES; Meg Modley, LCBP
- Purple line: GZA and Mass DCR
- Yellow line: Heidi Himes, USFWS; Dave Sagan, Silvio O. Conte\*
- Magenta line: Kim Jensen, VTDEC\*
- Blue line: Margot Burns, RiverCOG; Judy Preston CT Sea Grant\*
- Yellow line: Greg Bugbee, CAES; Margot Burns, RiverCOG\*
- Light green line: Laurie Callahan, SEVTAIS Project
- Cyan line: Laurie Callahan; Ann Bove

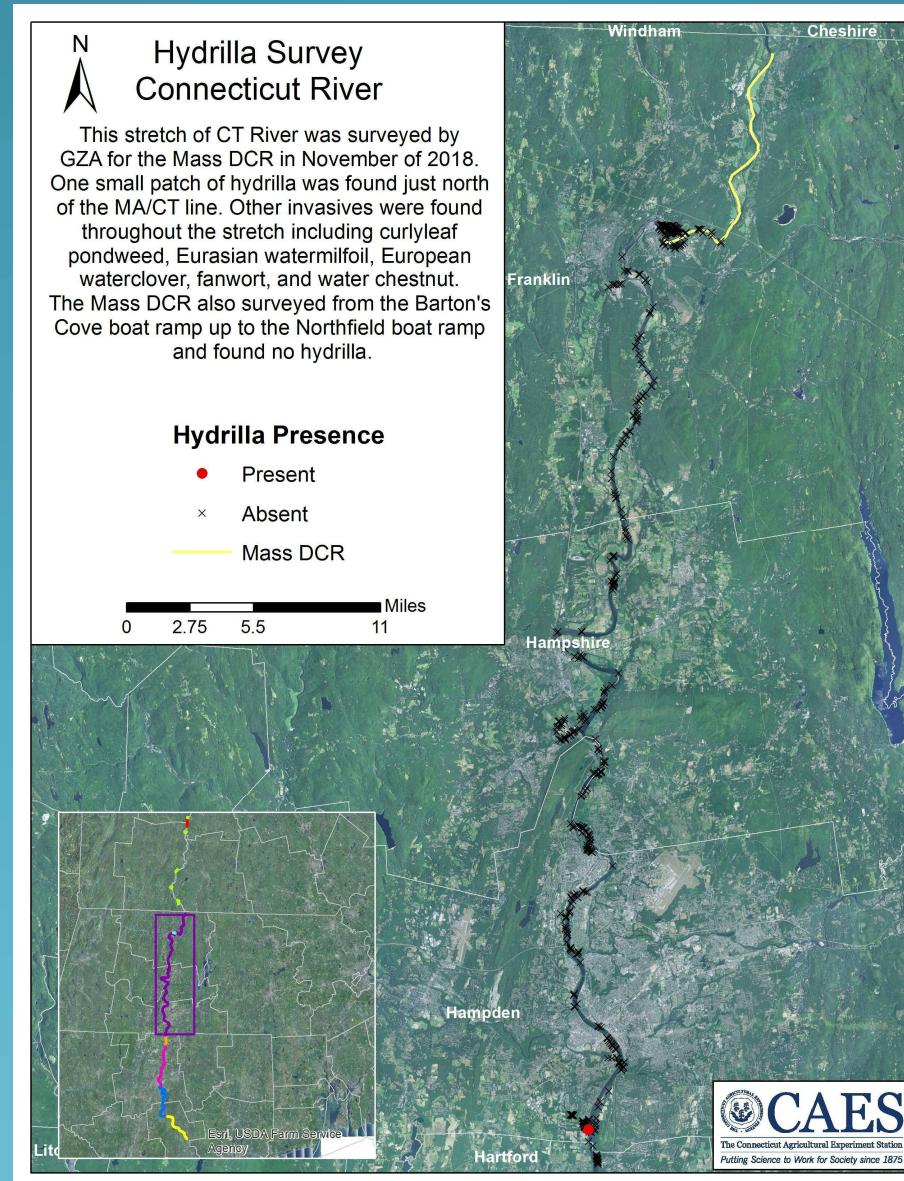
\*Hydrilla Found



0 5 10 20 Miles

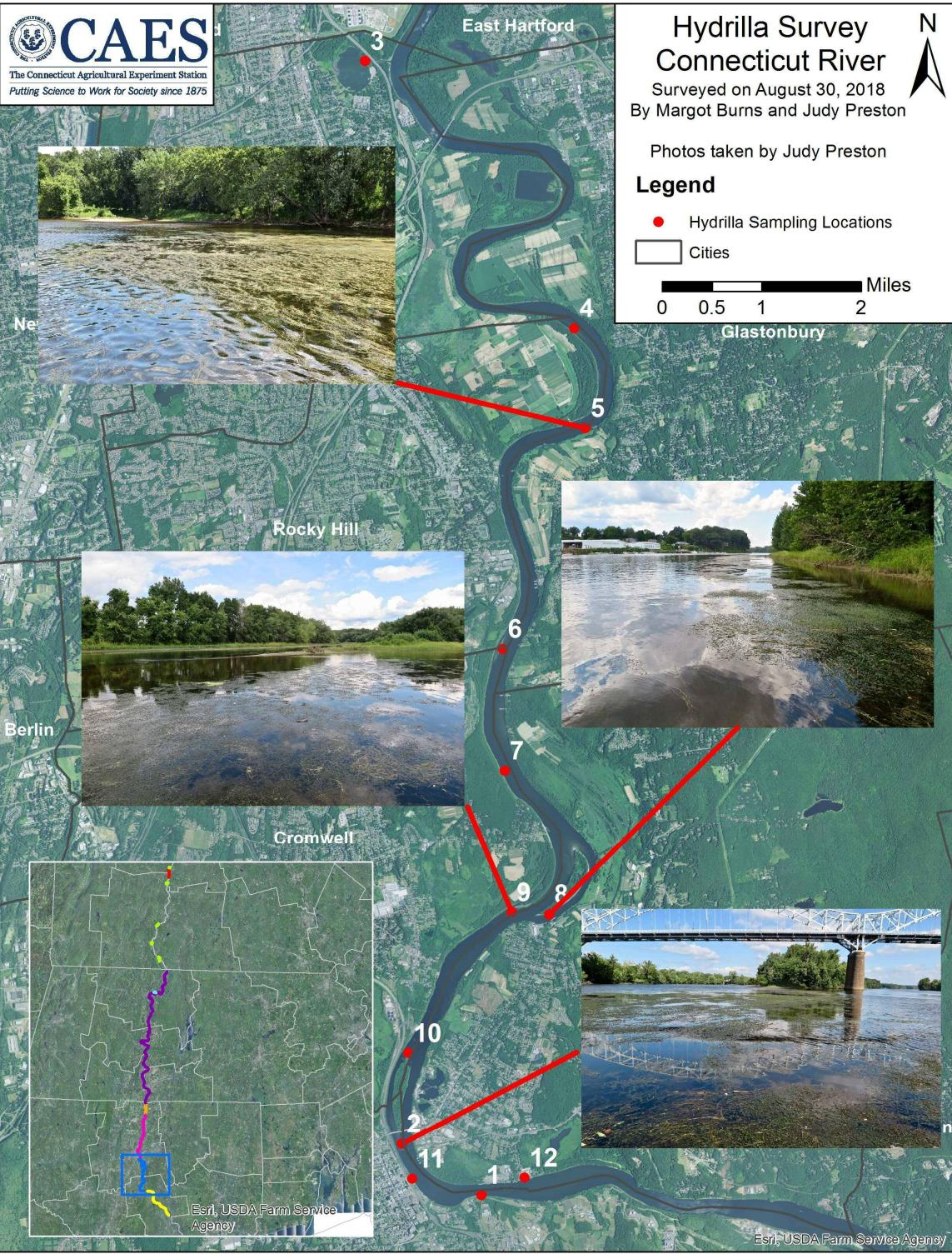


# Hydrilla only found along MA/CT border





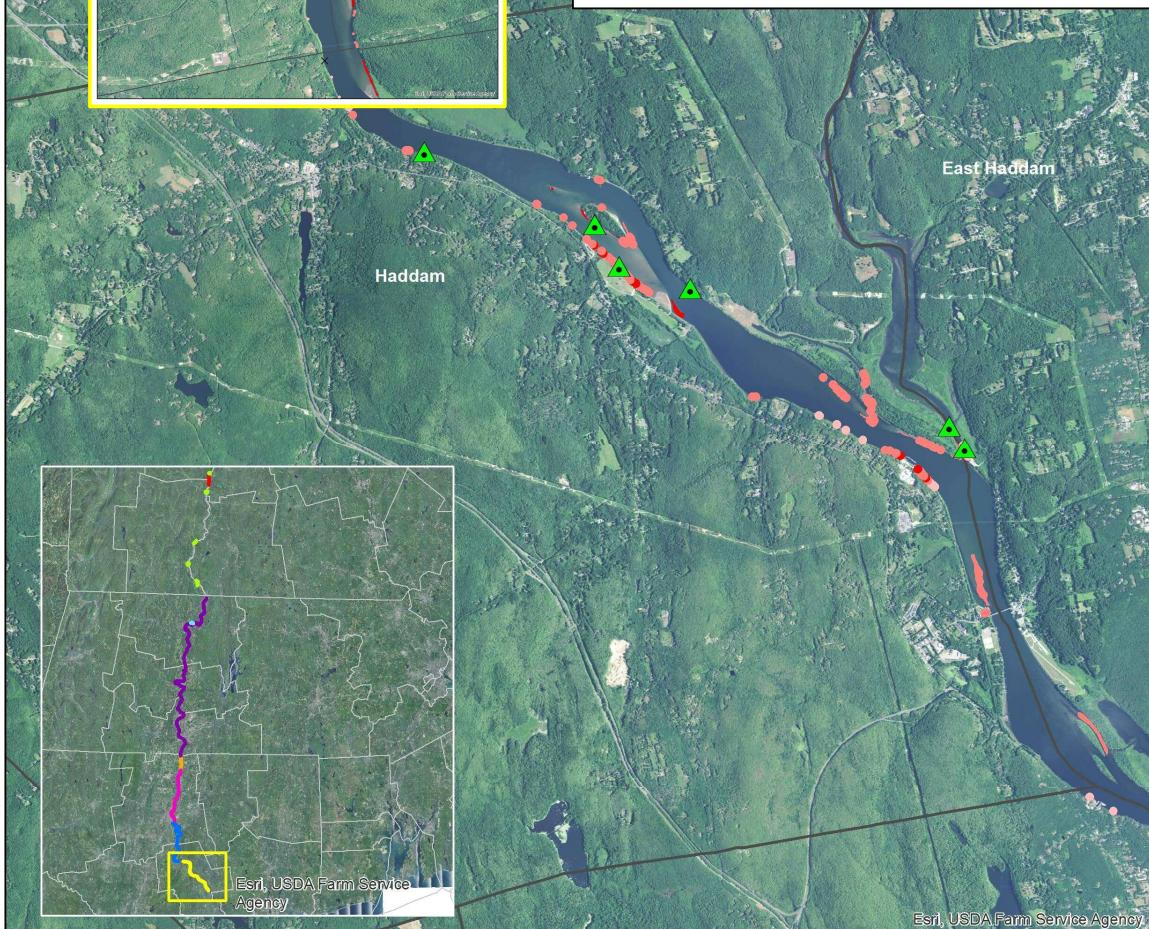
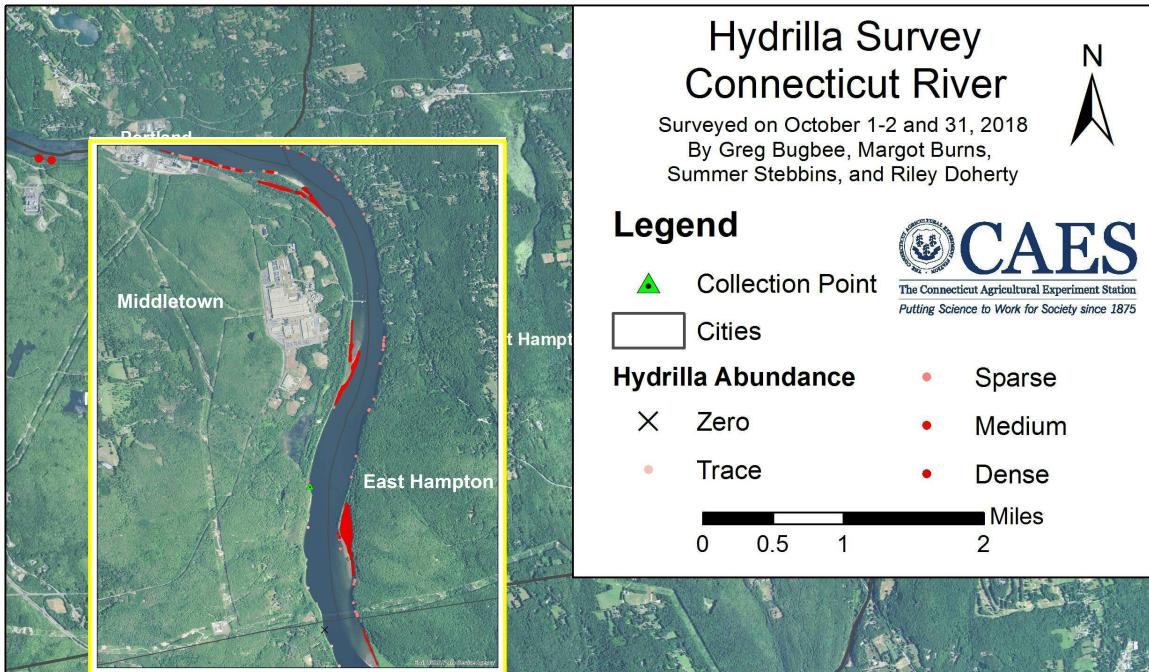
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# Keeney Cove - East Hartford, CT

Laurie Callahan, 6/26/18

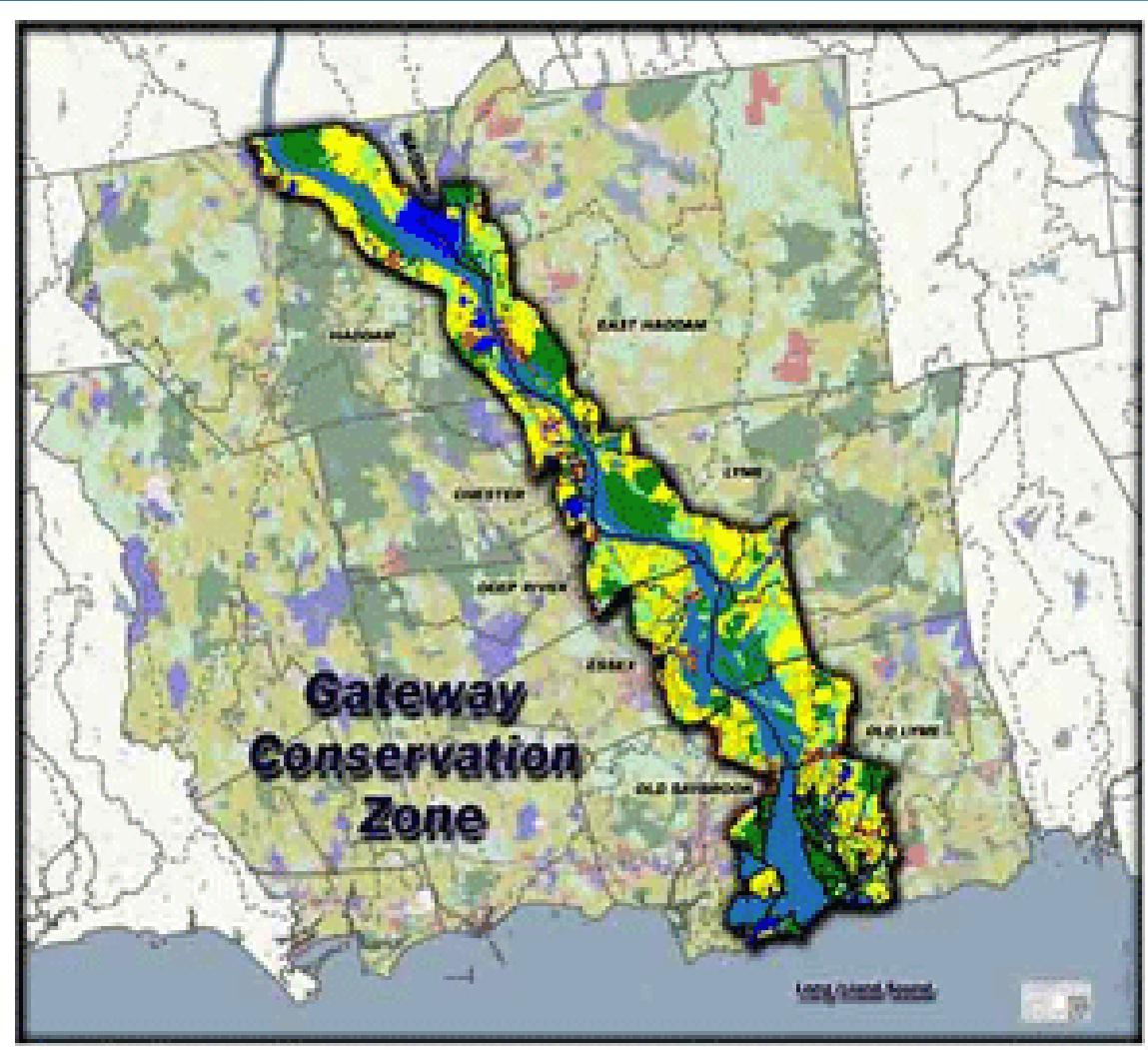




# East Hampton, CT



# Gateway Zone



- Shoreline and Major Coves
- 31 miles of survey

**Evidence for a genetically distinct strain of introduced *Hydrilla verticillata*  
(*Hydrocharitaceae*) in North America**

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**ABSTRACT**

The invasive aquatic weed hydrilla (*Hydrilla verticillata*) exists in North America as two genetically and morphologically distinct strains, with the dioecious strain mostly found in the southern United States and the monoecious strain being more northern, including previously known sites in Connecticut. In 2016 an additional hydrilla population was located in a portion of the Connecticut River in Hartford County, Connecticut, with unusual morphological features relative to other Connecticut populations. Hydrilla plants from this population were subjected to genetic testing, and their molecular sequences for one chloroplast (*trnL-F*) and two nuclear gene regions (ITS and *PDS*) were compared against published data. The Connecticut River hydrilla plants are distinct from all known North American plants, representing a novel introduction, likely from northern Eurasia. The genetic novelty of this recent introduction may present additional ecological and management challenges beyond what has been encountered for hydrilla to date.

**Key words:** hydrilla, invasive species, aquatic plants, *Hydrocharitaceae*, ITS, *PDS*, molecular phylogenetics

**INTRODUCTION**

*Hydrilla verticillata* (L.f.) Royle ('hydrilla') is a submersed aquatic angiosperm of ecological and economic importance. Globally it is among the most noxious invasive aquatic plants because of its ability to adapt to a variety of environments and outcompete native vegetation (Langeland 1996, Haller 2014). In North America, hydrilla consists of two 'strains', or 'biotypes': a monoecious strain and a dioecious strain, the latter comprising only female individuals in the introduced range (Ryan et al. 1995). Phylogenetic evidence from chloroplast (*trnL-F* region) and nuclear gene regions (internal transcribed spacer [ITS] and phytoene desaturase [*PDS*]) has demonstrated that the introduced hydrilla strains in North America were derived from two distinct sources. The monoecious strain most closely matches hydrilla plants that are native to Korea, whereas the dioecious strain resembles plants from India (Madeira et al. 1997, 2007, Benoit et al. 2019) and also matches plants more recently introduced to South America; Lucio LC, unpublished; Zhu et al., 2017).

Molecular data from the ITS and *PDS* regions have enabled a more thorough understanding of phylogenetic structure among hydrilla populations worldwide, including the two invasive North American strains. In addition to revealing extensive genetic variation, correlated to some extent with biogeography, the combined chloroplast and nuclear sequence data revealed a pattern of genetic mixture among geographically disparate populations, in both native and non-native ranges of hydrilla (Benoit et al. 2019). Both the monoecious and dioecious strains are predominantly triploid (Harlan et al. 1984, Langeland 1989), and their molecular sequences

# Questions?

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