HYDRILLA RESEARCH & DEMONSTRATION PROJECT IN THE CONNECTICUT RIVER

Stakeholder Public Meeting
June 29, 2023

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Project Manager
New England District – USACE

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U.S. ARMY

US Army Corps of Engineers®
New England District

CT RIVER HYDRILLA DEMONSTRATION PROJECT

Background	Discuss hydrilla invasion background and knowledge
Demonstration Project	Introduce USACE Connecticut River Demonstration Project
Questions	Discuss questions and gather feedback on proposed actions
Discussion	Discuss hydrilla prevalence, spread, and treatment methods being employed by northeast states
Understand	Understand public concerns and priorities regarding CT River hydrilla management

PROJECT TEAM

Keith Hannon

Project Manager
USACE New England District

Ben Sperry

Technical lead and aquatic invasive species expert
USACE Engineer Research and Development Center Aquatic Plant Control Research Program

Margot Burns

Senior Environmental Planner

Lower Connecticut River Valley Council of Governments

Gregory Bugbee

Associate Scientist Invasive Aquatic Plant Program

The Connecticut Agricultural Experiment Station

RIVERCOG AND CAES PUBLIC OUTREACH

2019 RiverCOG 12 Town Ct River Hydrilla CT RC&D ERT Request

- **CAES survey** of the waters of the lower Connecticut River .
- **Video** – *Invading the Connecticut River – The Spread of Hydrilla*
- **4 Part Webinar Series** Invasives, Lower Connecticut River

Survey funded by: Connecticut River Gateway Commission and the Eight Mile River Wild & Scenic.

2020 National Invasive Species Week - North America Invasive Species Management Association Webinar

***Successful Aquatic Plant Management Strategies Across the United States,* Dr Robert Richardson** – University of North Carolina – last 20 minutes are the most important as it concerns Hydrilla

2022 National Invasive Species Week Congressional Briefing - North America Invasive Species Management Association Webinar

Managing the Hydrilla River Infestation in the Connecticut River

Monthly Updates to RiverCOG

FUNDING

STATE

Public Act 19-190 "Connecticut Lakes, Rivers and Ponds Preservation Account"

Aquatic Invasive Species Stamp – Boat Registrations –
CT DEEP Grant Program – 1st grant round 2022

- Restoration and rehabilitation of lakes, rivers and ponds in the state;
- Programs of DEEP for the eradication of aquatic invasive species and cyanobacteria blooms;
- Education and public outreach programs
- Grants to state and municipal agencies
- Funds for all services that support the protection and conservation of the state's lakes, rivers, and ponds

2022 CAES:
Creation of the Office of Aquatic Invasive Species through the existing Aquatic Invasive Aquatic Plant Program and funding of three positions.

FEDERAL

2018 NEANS funding – genetic testing

Omnibus Funding – FY22 and FY23, working on FY24. US Army Corps
Aquatic Nuisance Species Research Program, Aquatic Plant Control Research Program


Salmon Cove 2019. mburns

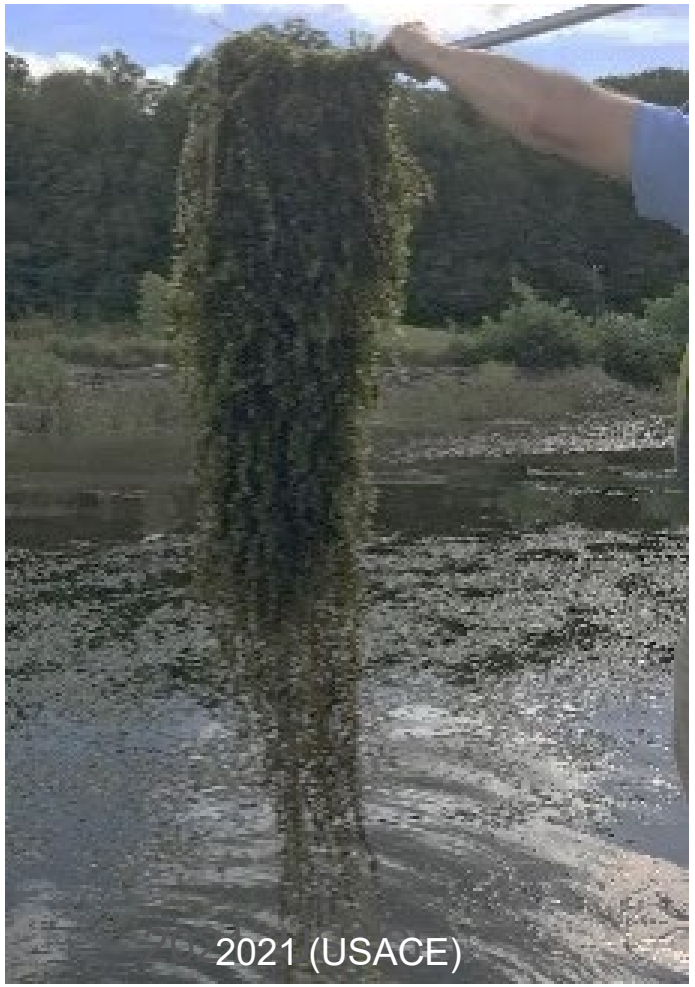
CONNECTICUT RIVER HYDRILLA BACKGROUND

- First detected in the CT River in 2016 around Glastonbury, CT
- 2019 and 2020 survey from Agawam, MA to the Long Island Sound found hydrilla as far north as Agawam, MA
- Connecticut River hydrilla confirmed to be genetically distinct strain (*Tippery, Bugbee, and Stebbins 2020*).

Hydrilla surveyed from Connecticut River by CAES in 2021: Invasive Aquatic Plants in the Connecticut River (arcgis.com)

CONNECTICUT RIVER HYDRILLA STRAIN

- Easily fragmented, and fragments are easily transported by boats, trailers, wind, and water currents
- Each fragment can establish a new population
- Can double in biomass every two weeks during the summer and fill the entire water column up to 20 feet deep forming a monoculture (dominated by a single species)
- Monoculture prevents growth of native aquatic plant species, contributing to a loss of biodiversity
- Prolific turion production observed


2021 (USACE)

CONNECTICUT RIVER HYDRILLA IMPACTS

Hydrilla-impacted marina on Connecticut River,2020 (CAES)

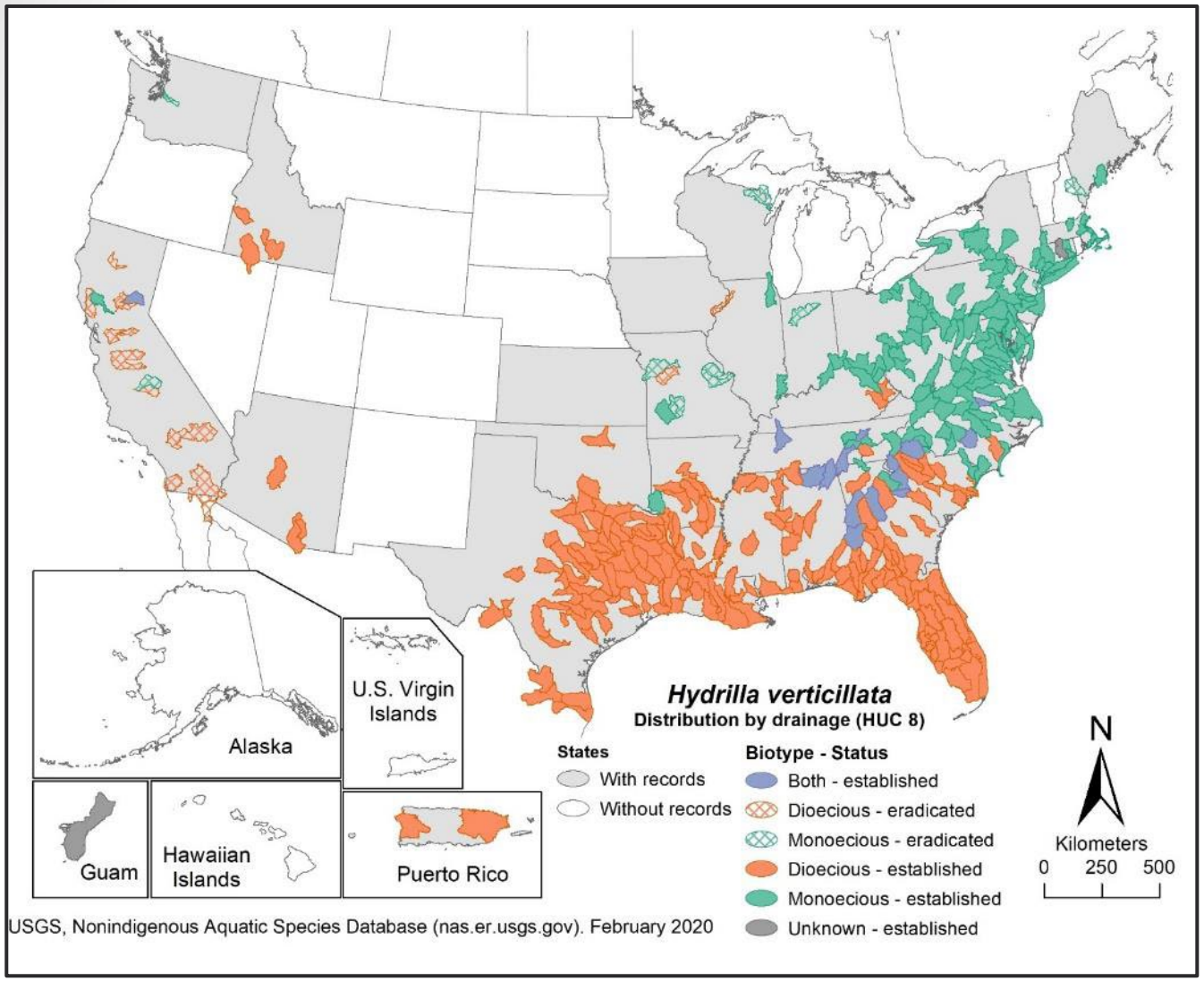
Environmental Impacts

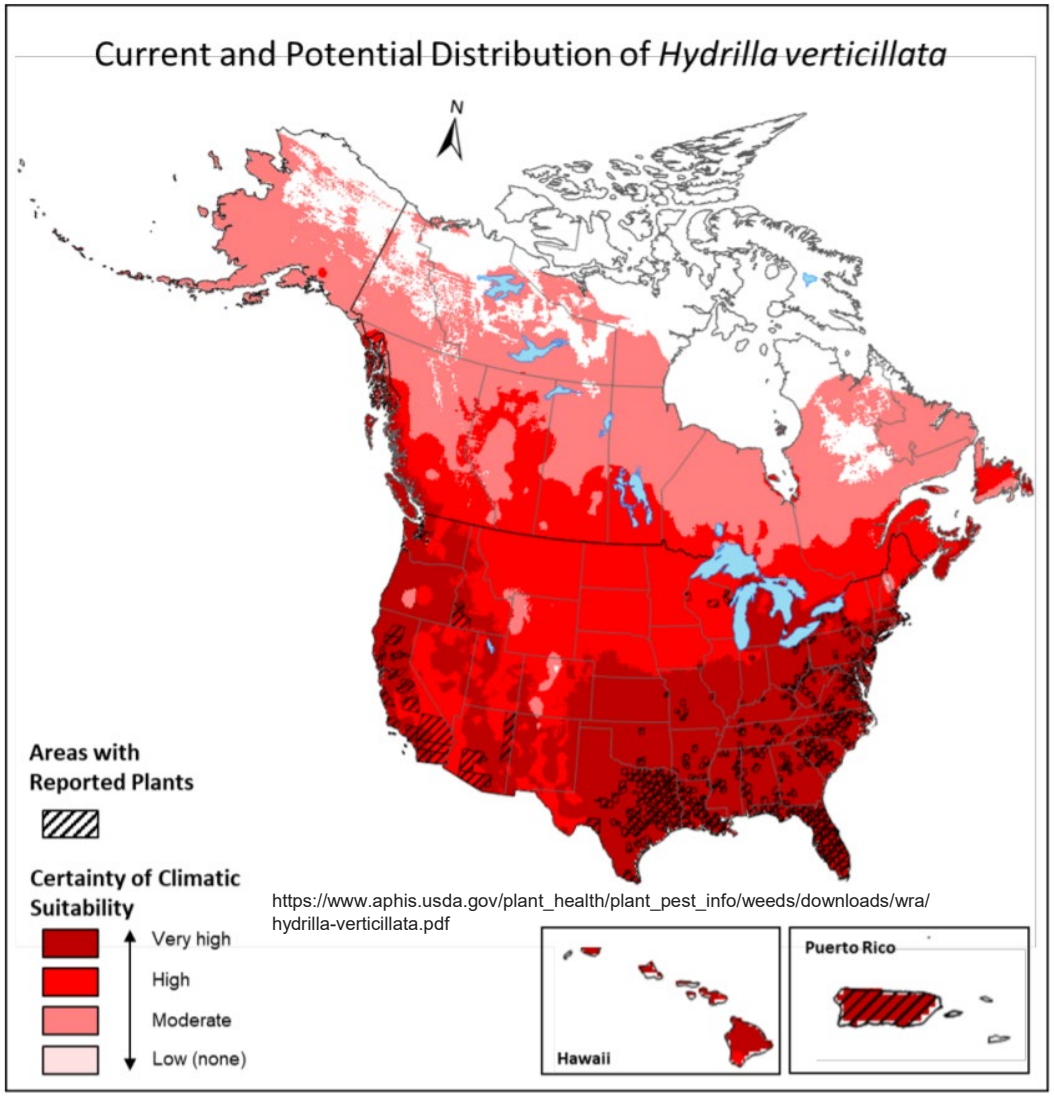
- Out-compete native plants (e.g., eelgrass)
- River flow reduction / increased flood risk
- Water chemistry alteration: decreased dissolved oxygen concentrations, blocked water/atmosphere gas exchange, higher water temperatures, increased pH

Human Impacts

- Boating and mooring access compromised
- Decreased waterway navigability
- Economy: reduction or loss of swimming, fishing, and boating opportunities
- Waterfront property value decline
- Drinking water source chemistry changes
- Flood control, hydropower, irrigation infrastructure interference/blockages

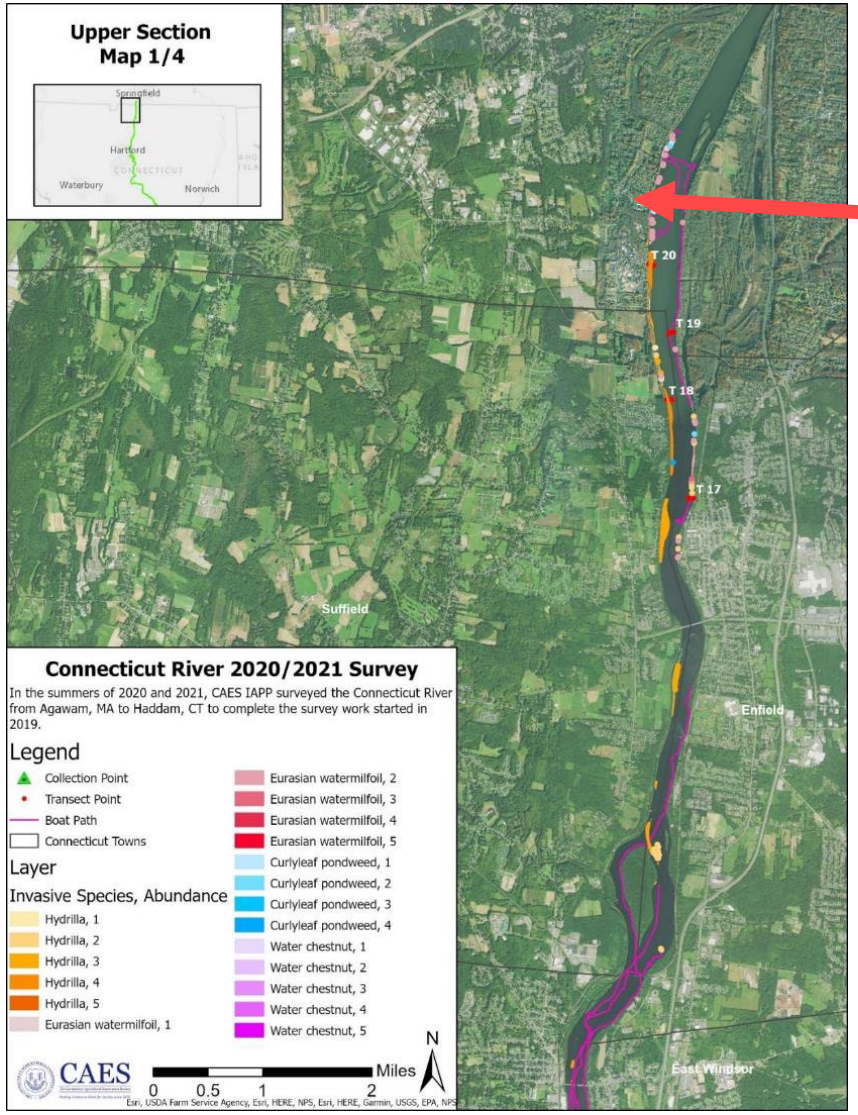
CURRENT AND POTENTIAL LOCATIONS OF HYDRILLA





https://www.aphis.usda.gov/plant_health/plant_pest_info/weeds/downloads/wra/hydrilla-verticillata.pdf

NORTHERN EXTENT - AGAWAM, MA



KEENEY COVE – EAST HARTFORD

MATTABESSET RIVER - MIDDLETOWN

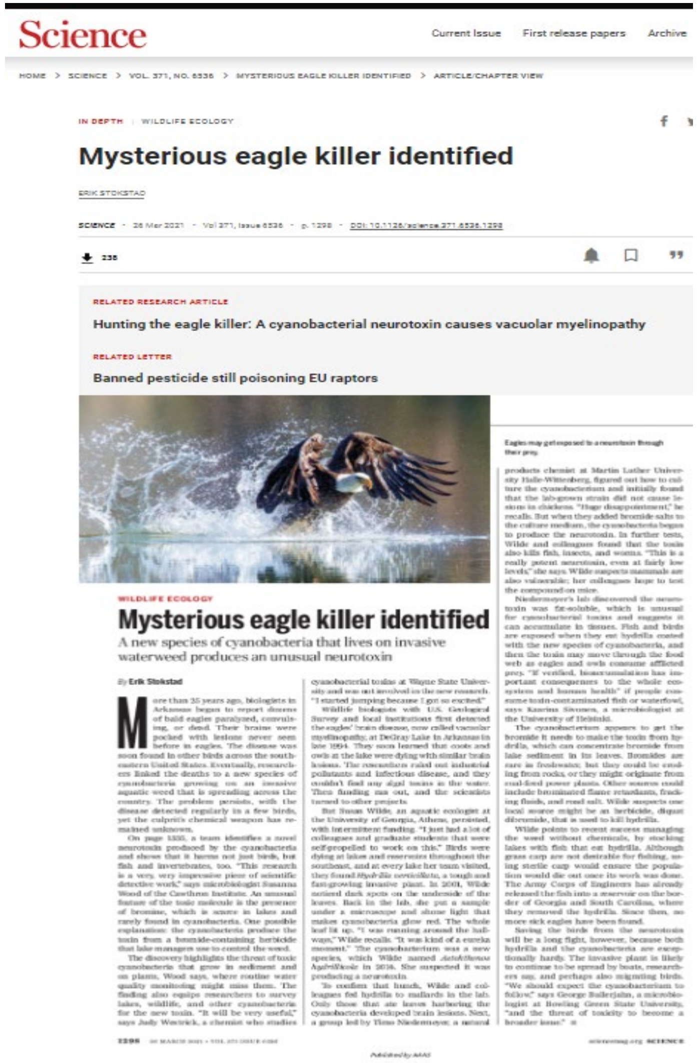
SALMON RIVER – EAST HADDAM

SELDON COVE - HADLYME

PORTLAND BOAT WORKS - PORTLAND

HYDRILLA IS REPLACING NATIVE EELGRASS

HYDRILLA CAN HARBOR TOXIC ALGAE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IN DEPTH | WILDLIFE ECOLOGY

Mysterious eagle killer identified

ERIK STOKSTAD

RELATED RESEARCH ARTICLE

Hunting the eagle killer: A cyanobacterial neurotoxin causes vacuolar myelinopathy

RELATED LETTER

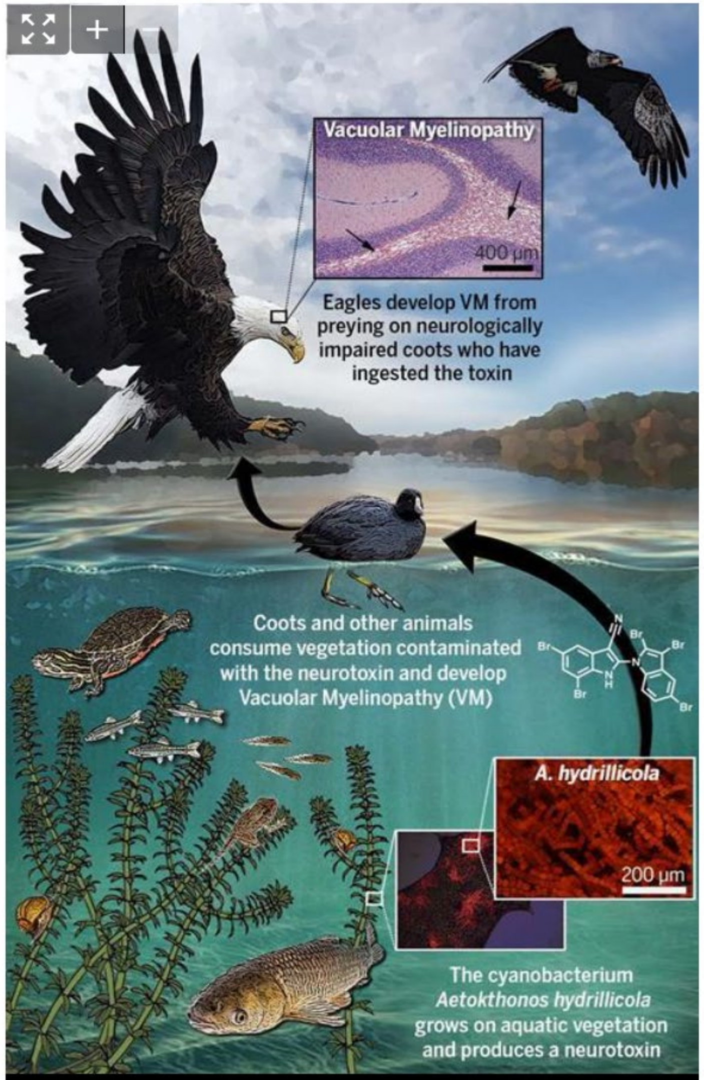
Banned pesticide still poisoning EU raptors

WILDLIFE ECOLOGY

Mysterious eagle killer identified

A new species of cyanobacteria that lives on invasive waterweed produces an unusual neurotoxin

By Erik Stokstad



Source: © Science/AAAS

Science. 2021 Mar 26;371(6536):eaax9050. doi: 10.1126/science.aax9050.

Hunting the eagle killer: A cyanobacterial neurotoxin causes vacuolar myelinopathy

Steffen Breinlinger [# 1], Tabitha J Phillips [# 2], Brigette N Haram [2], Jan Mareš [3 4 5], José A Martínez Yerena [3 5], Pavel Hrouzek [4 5], Roman Sobotka [4 5], W Matthew Henderson [6], Peter Schmieder [7], Susan M Williams [8], James D Lauderdale [9], H Dayton Wilde [10], Wesley Gerrin [2], Andreja Kust [3], John W Washington [6], Christoph Wagner [11], Benedikt Geier [12], Manuel Liebeke [12], Heike Enke [13], Timo H J Niedermeyer [# 14], Susan B Wilde [# 15]

Affiliations + expand

PMID: 33766860 PMCID: PMC8318203 DOI: 10.1126/science.aax9050

Free PMC article

CONNECTICUT RIVER HYDRILLA MANAGEMENT

- No eradication program in CT currently exists for hydrilla
- Stakeholders seeking aggressive eradication and management due to CT River importance to the environment and local economy
- Stakeholders and members of Congress from MA, CT, and VT requested USACE hydrilla management assistance in CT River
- Current USACE research & demonstration project funded by FY23 Congressional Energy and Water Development appropriation

USACE INVOLVEMENT

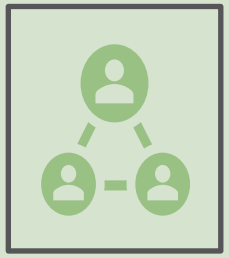
hydrilla beds in the Erie Canal, September 2012. Photo courtesy of ERDC

- USACE involved in hydrilla management since the 1960s
- Hydrilla control measures are a major focus of USACE's Aquatic Plant Control Research Program
- Federal funding has been designated for USACE to study hydrilla on the CT River

PROJECT OBJECTIVES

Implement science that protects public and environmental safety

Conduct research to develop and evaluate best management practices



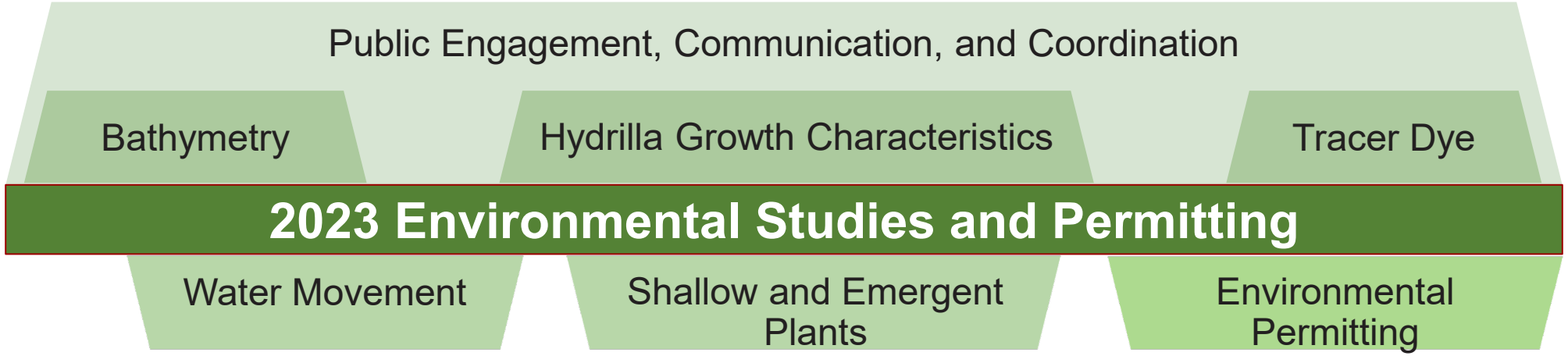
Technology transfer of best management practices

USACE DEMONSTRATION PROJECT GOALS

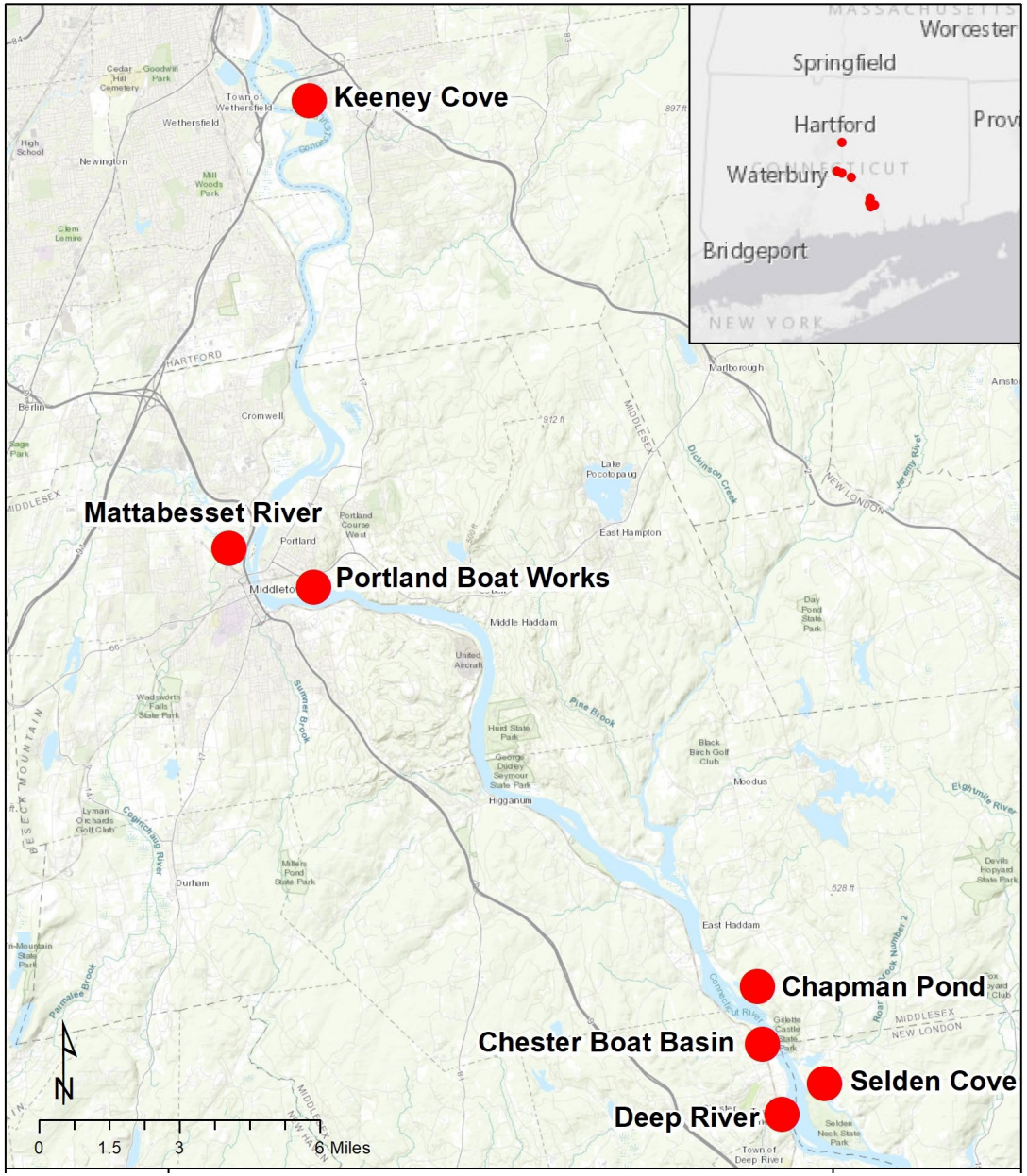
- Public safety primary goal when considering control options, and the potential use of EPA approved aquatic herbicides
- Develop a strategy and treatment plan with a focus on using new techniques (use less chemicals & saves $) to remove hydrilla from the CT River at selected sites
- Protect and restore the Connecticut River & tributaries, and associated ecological and economic benefits from hydrilla invasion impacts

PROPOSED ACTIONS FOR SUMMER/FALL 2023

- Public engagement, stakeholder notification, and coordination
- Environmental and technical studies to guide site selection and treatment plan development
- Federal, state, and local environmental permitting



PROPOSED DEMONSTRATION PROJECT LOCATIONS



- 7 sites selected for 2023 environmental studies
- A subset of these locations will be selected for 2024 field demonstration based on 2023 survey results

CT RIVER HYDRILLA DEMONSTRATION PROJECT

Ben Sperry, PhD – Research Biologist
USACE Engineer Research and Development Center (ERDC)

ERDC
ENGINEER RESEARCH & DEVELOPMENT CENTER

AQUATIC PLANT PLANT MANAGEMENT TEAM

- Conduct R&D to provide operational guidance to CE Districts and partner Federal, state, and local agencies for improved management of invasive aquatic vegetation
- Serve as subject matter experts to other agencies for aquatic plant control issues
- Collaborate with other entities to develop/evaluate management tools for use in the US

ERDC
ENGINEER RESEARCH & DEVELOPMENT CENTER

EL

THE PLANT: CLADE C HYDRILLA (CT HYDRILLA)

- Genetically distinct strain discovered in 2016
- Very little applied management research conducted to date
- Will require management to maintain needs of users, local economies, and fish & wildlife
- Potential to spread to outside systems
- Applied research approach = determination of optimal control methods and provide science-based management guidance to key agency personnel

THE SITE: CONNECTICUT RIVER

- Extremely large
- Many users
- Tidally influence
- Hydrodynamically complex - site-specific water exchange characteristics

THE UNKNOWN: RESEARCH GAPS

- Detailed understanding of growth and reproduction under varying environmental conditions
- Water exchange dynamics in the CT River
- Management timing in conjunction with phenological “weak points” in the life cycle
- Identification of the most effective and selective herbicides:
  - Application rates
  - Exposure time requirements
  - Application techniques to optimize control

THE PLAN: RESEARCH OBJECTIVES

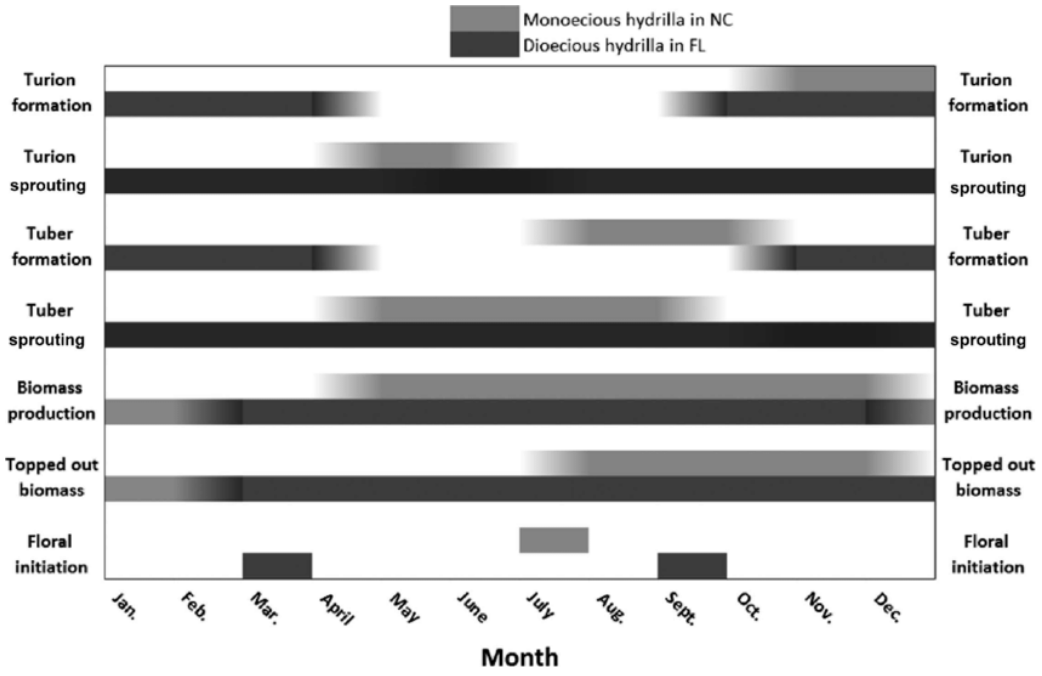
Measure	Current knowledge	Approach	Goal
Development of herbicide strategies for selective hydrilla control	Response of CT hydrilla to herbicides in site-specific exchange patterns is currently unknown	Field and mesocosm studies	Provide information required to initiate and refine product- and site-specific management guidance
Biology, Ecology, and Phenology of CT hydrilla	Largely unknown	Field and mesocosm studies	Identification of weak points for targeted management and understanding of potential range of spread outside CT River
Development of management and containment protocols for the CT River and other systems	Management and Containment protocols available for other submersed species	Capstone data compilation for short and long-term hydrilla management and containment	Operational protocols to guide resource managers

1) WATER EXCHANGE AND HERBICIDE APPLICATION TECHNIQUES

- Tracer dye (Rhodamine WT) studies
- Site-specific water exchange rates
- Herbicide delivery technique evaluation

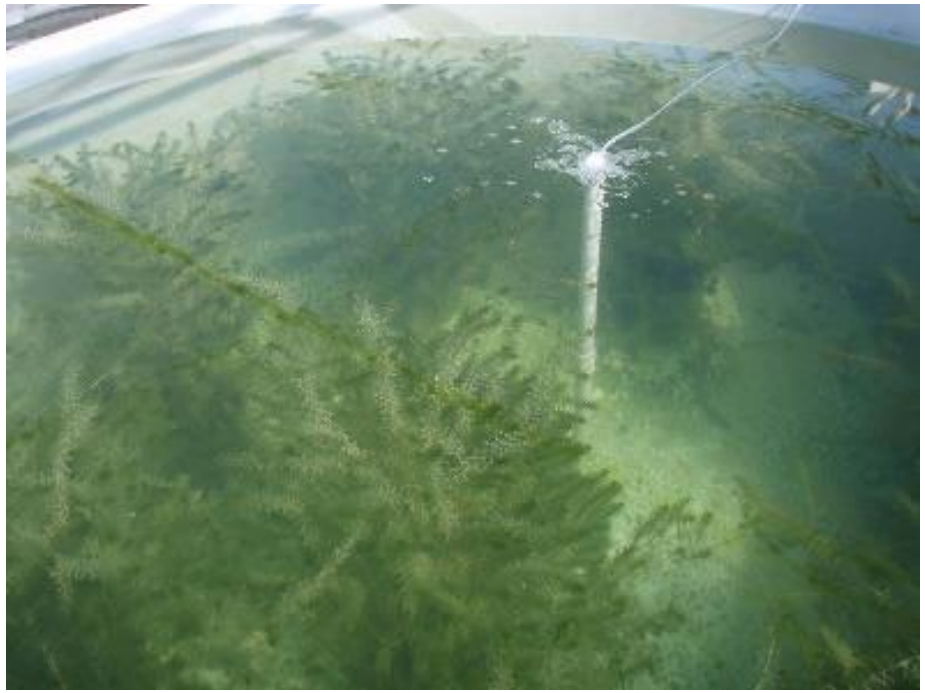
2) PLANT PHENOLOGY

- Life cycle research
- Record major reproduction and growth events
- Identify weak points for management interventions



3) HERBICIDE ASSAYS - MESOCOSMS

- Plant/herbicide exposure relationships



CONCENTRATION-EXPOSURE TIME RELATIONSHIPS

- Aquatic herbicide treatment success depend on two related factors:
  - 1.) Herbicide concentration in contact with target plants (5 to 5000 ppb)
  - 2.) Length of time target plant is exposed to dissipating herbicide concentrations (hours to months)

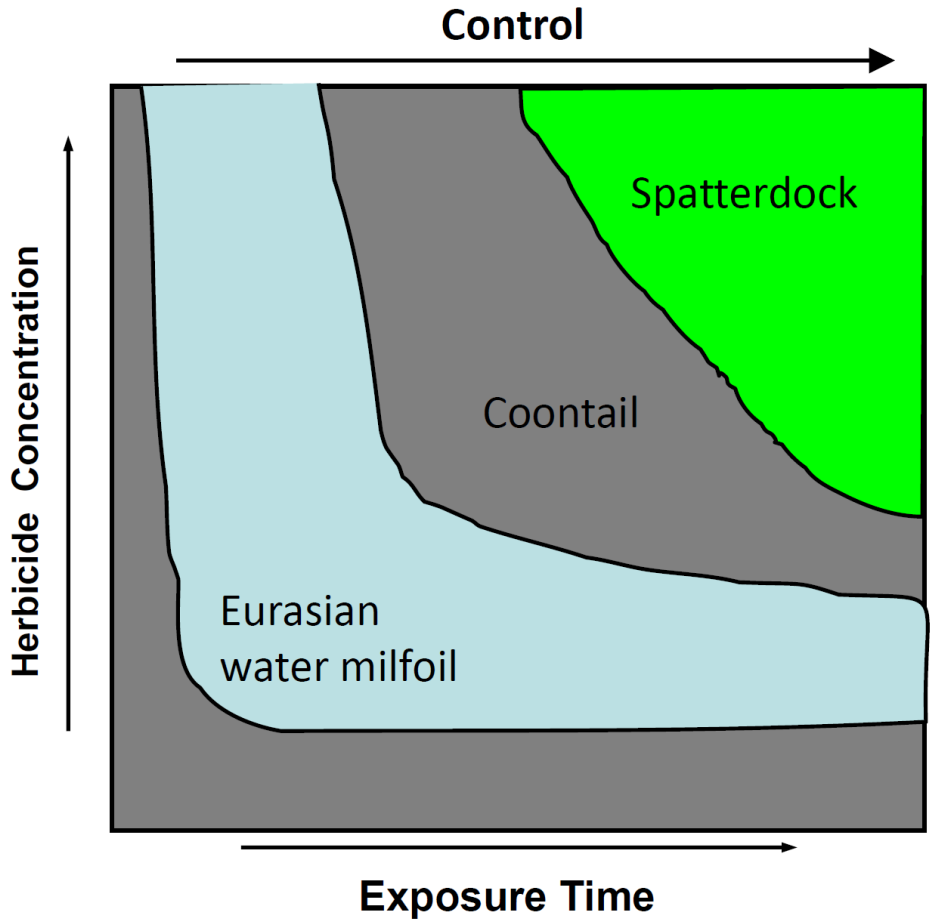
- Applications to entire water bodies (whole-system) typically result in long exposure times since dissipation is less of a factor (focus on long ET herbicides)

- Applications to flowing-water or partial system treatments typically experience greater water exchange over a short period of time and result in short exposure times.

- Failure to achieve target concentration and exposure time will result in reduced control

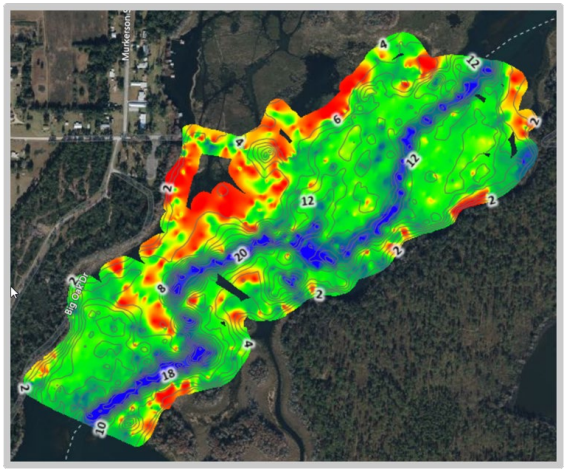
CONCENTRATION EXPOSURE TIME (CET) AND SELECTIVITY

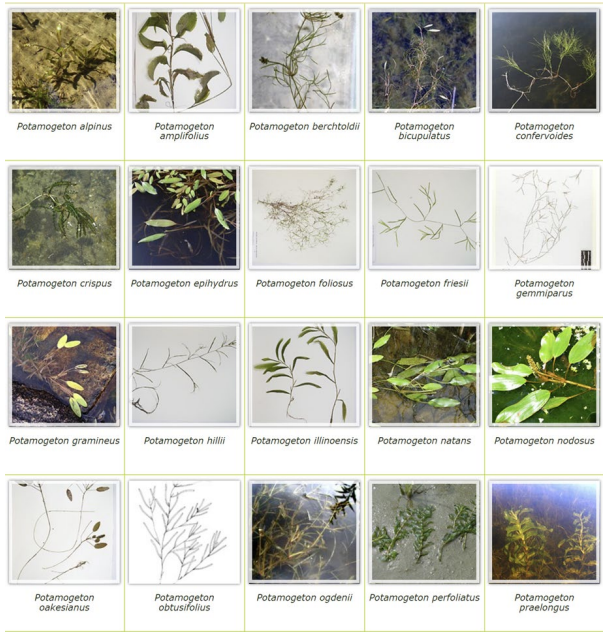
- Each plant species has a unique “CET profile” or dose-sensitivity to each herbicide



4) HERBICIDE TREATMENT DEMONSTRATIONS

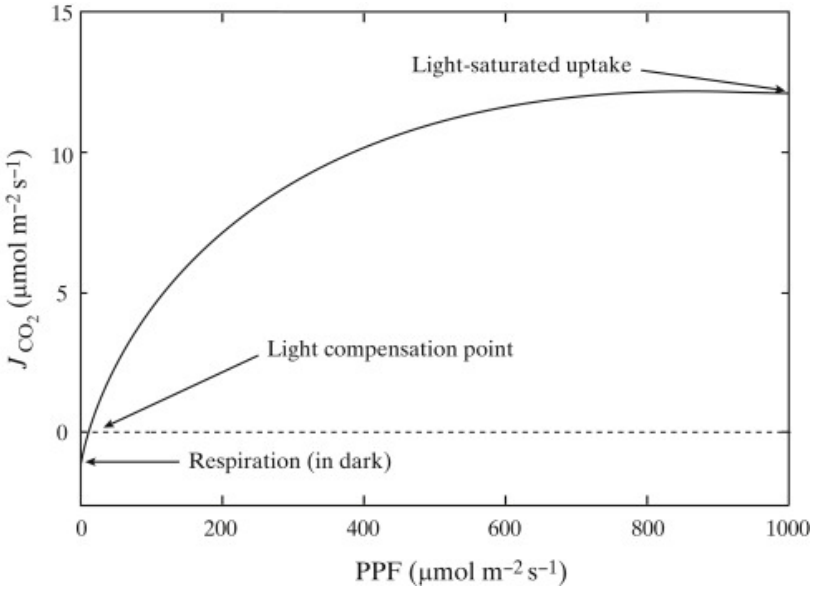
- Base on small-scale data for efficacy and selectivity
- Small plot evaluations
- Measure aqueous herbicide concentrations, plant control, non-target plant response

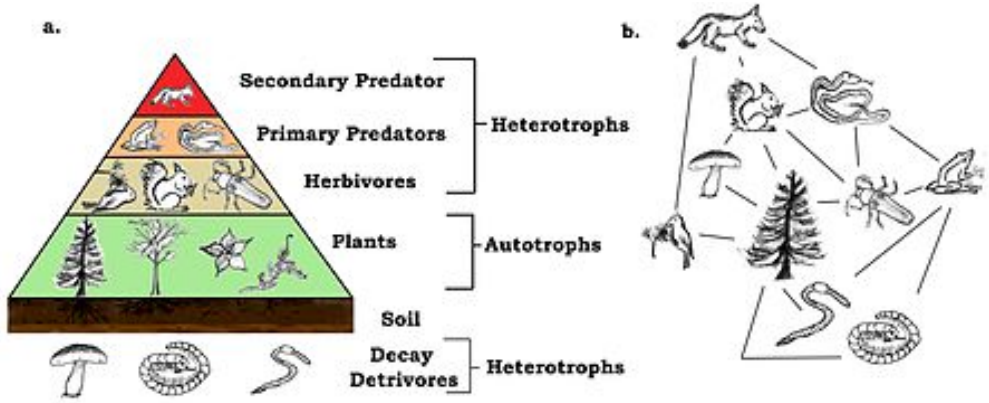




5) PLANT BIOLOGY AND ECOLOGY

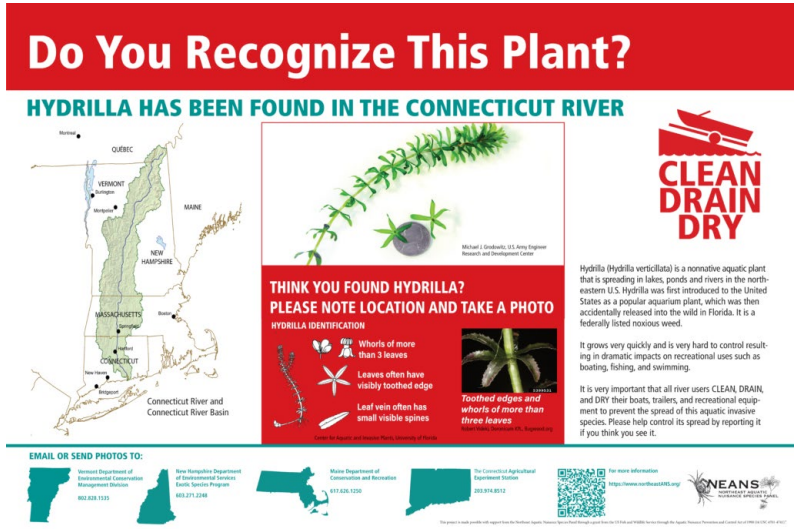
- Competitiveness with native plants
- Turion production dynamics
- Hybridization potential
- Environmental impacts on growth
  - Temperature
  - Salinity
  - Light

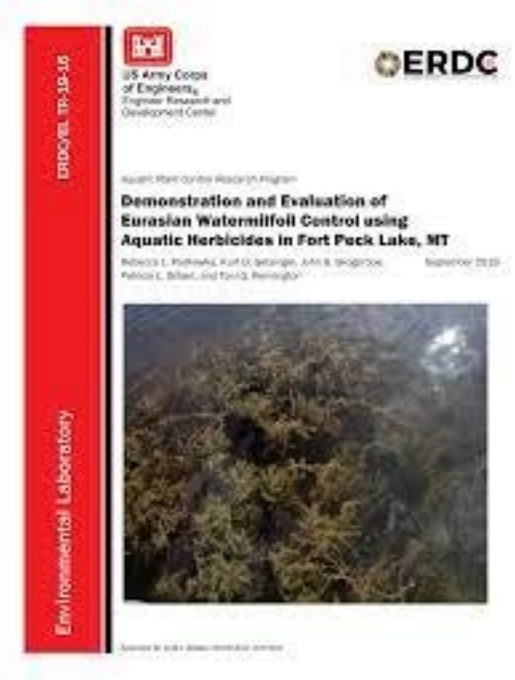




6) END-USE GUIDANCE

- Master guidance document
- Resource management workshops
- Containment and management protocols





ANTICIPATED NEXT STEPS FOR 2024

1. Select a subset of the seven studied sites for management demonstration
2. Develop a treatment plan for hydrilla removal using best practices for public and environmental safety
3. Implement the management plan to demonstrate its effectiveness
4. Monitor demonstration sites to evaluate outcomes
5. Revise and finalize the CT River management strategy
6. Work with the public and resource agencies to gain support for widespread and coordinated implementation of the recommended management actions

OPEN DISCUSSION / QUESTIONS?

- Questions about hydrilla invasion on the CT River?
- Discuss hydrilla prevalence, spread, and treatment methods being employed by northeast states
- Public concerns and priorities for management actions?
- Discuss questions and gather feedback on proposed actions

Point of Contact Email:
CTRiver-Hydrilla@usace.army.mil

NAE District hydrilla website:
https://www.nae.usace.army.mil/Missions/Projects-Topics/Connecticut-River-Hydrilla/

- Additional hydrilla information
- Fact sheets
- Additional resources and links

CT RIVER HYDRILLA DEMONSTRATION PROJECT

Thank You!