APPENDIX D

FIELD SURVEYS FOR RARE PLANTS REPORT

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Interim Report

Field Surveys for Rare Plants Hydrilla control demonstration site selection along Connecticut River

By

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For

Environmental Assessment Services LLC

18 September 2023

Described herein is a report of botanical surveys of potential Hydrilla control demonstration sites: Selden Cove (Lyme), Deep River tributary (Deep River), Chapman Pond (East Haddam), Keeney Cove (East Hartford/Glastonbury), and Mattabesset River (Middleton). These surveys were part of Task 2 of the "Development and Field Evaluation of Precision Dye and Herbicide Submersed Application Techniques to Control Hydrilla in the Connecticut River Watershed" project to help minimize any rare species impacts during proposed Hydrilla control.

Methods

All suitable habitats (i.e., exposed mudflats, subtidal, and intertidal waters) of the target species (Table 1) were assessed during the current growing season, at an appropriate period for diagnostic material. An effort was made to inventory the vascular plants encountered at the sites and to describe the plant communities. The areas were surveyed by either airboat, kayak (Deep River only), or at times on foot when shores looked favorable for occurrences. Sites were surveyed on August 28/29 (Seldon Cove), 29 (Deep River, Chapman Pond), and 31 (Keeney Cove, Mattabesset River). I was accompanied by either Marc Ballaud or Keith Gazaille (Aug 28) of Solitude, Inc.

When species were difficult to diagnose in the field, fragments were collected and later identified or confirmed. All determinations were made using Crow & Hellquist (*Aquatic and Wetland Plants of Northeastern North America*), Gleason & Cronquist (*Manual of Vascular Plants of Northeastern United States and Adjacent Canada*), and/or Haines (*Flora Novae-Angliae*) as references. All nomenclature is that adopted by Haines (*Flora Novae-Angliae*).

Findings

<u>Selden Cove</u>. The littoral zone of this tidally influenced cove is dominated by *Zizania aquatica* and *Pontederia cordata*. Other plants observed included *Peltandra virginica*, *Lythrum salicaria*, *Iris* cf. *pseudacorus*, *Sagittaria latifolia* and *Phragmites australis*. The open water was dominated by *Hydrilla verticillata*, and included sporadic occurrences of *Trapa natans*, *Ceratophyllum demersum*, *Spirodela polyrhiza*, *Vallisneria americana*, and *Myriophyllum*

spicatum. At low tide, a large island-like mudflat was exposed (Fig. 1) to reveal numerous individuals of *Sagittaria montevidensis* subsp. *spongiosa* (Fig. 2). This species was also observed on a portion of the exposed southeast shore. **Target species:** Occurrences of *Sagittaria subulata* were observed at two locations: the exposed mutflat "island" within Selden Cove and along an exposed western shore of Selden Creek (Figs. 3-4). Individuals were numerous (est. 30-50) at each location, connected by stolons, but sterile. Plants in Selden Cove were intermixed with *S. montevidensis* subsp. *spongiosa*. No individuals of *Orontium aquaticum, Bidens beckii, Eriocaulon parkeri, Nuphar microphylla,* or *Schoenoplectus torreyi* were observed in or around Selden Cove.

<u>Deep River tributary</u>. This tributary had typical emergent freshwater tidal marsh flora on the shores and submersed community in the water channels. The littoral marsh was dominated by *Zizania aquatica*, *Typha latifolia*, and *Acorus americana* (Fig. 5). Other marsh plants observed included *Pontederia cordata*, *Sagittaria latifolia*, *Peltandra virginica*, and *Lobelia cardinalis*. The open water was dominated by *Hydrilla verticillata* (Fig. 5). Other aquatics included *Nuphar variegata*, *Trapa natans*, *Ceratophyllum demersum*, *Spirodela polyrhiza*, *Vallisneria americana*, *Elodea nuttallii*, *Ludwigia palustris*, and *Myriophyllum spicatum*. **Target species:** No individuals of *Orontium aquaticum* were observed in or around this site.

<u>Chapman Pond</u>. The littoral zone of Chapman Pond is co-dominated by *Zizania aquatica*, *Peltandra virginica*, *Phragmites australis*, and *Bulboschoenus fluviatilis*. Other plants observed included *Typha angustifolia*, *Pontederia cordata*, *Scirpus cyperinus*, *Schoenoplectus tabermontani*, and sterile *Schoenoplectus* cf. *pungens*. The open water was dominated by *Hydrilla verticillata*, and included sporadic occurrences of *Trapa natans*, *Ceratophyllum demersum*, *Callitriche*, and *Vallisneria americana* (Fig. 6). **Target species:** No individuals of *Orontium aquaticum* or *Schoenoplectus torreyi* were observed in Chapman Pond. One individual of *O. aquaticum* was observed on the north shore of the creek running to the east of Chapman Pond (Fig. 7).

<u>Keeney Cove</u>. This tidal cove, transected by a road, was severely infested with *Hydrilla* and *Trapa* in the northern section. The open water was dominated by *Hydrilla verticillata*, and *Trapa*

natans, with occasional *Nuphar variegata, Nymphaea odorata, Lemna, Spirodela polyrhiza, Wolffia borealis,* and *Ceratophyllum demersum* (Fig. 8). The littoral zone of the northern portion was dominated by *Bulboschoenus fluviatilis*, especially on northern and western shores. Other emergent plants observed included *Persicaria,* sterile *Sagittaria latifolia,* and *Pontederia cordata.* **Target species:** No individuals of *Sagittaria cuneata* were observed in Keeney Cove.

<u>Mattabesset River</u>. This tidal freshwater river had an expansive marsh component dominated by *Bulboschoenus fluviatilis* and *Peltandra*. Other marsh plants observed included *Zizania aquatica Phragmites australis*, and *Pontederia cordata*. The southern section of the river (closest to Connecticut River) was surrounded by floodplain woodlands, rather than marshes. These areas had steep, shaded shorelines, with *Onoclea sensibilis*, *Eleocharis*, *Iris*, *Persicaria*, and various grasses in the understory (Fig. 9). **Target species:** No individuals of *Lipocarpha micrantha* were observed in the Mattabesset River.

Conclusions

Field surveys located occurrences of only one rare species within a single proposed treatment area. Numerous individuals of *Sagittaria subulata* were identified along the central island-like mutflat (exposed only at low tidal) of Selden Cove (Figs. 1, 3-4). These plants are positioned at the southern limit of the proposed treatment area (N41°24"38.9 W072°24"59.2; Figs. 1, 4). A population of *Sagittaria subulata* was also found nearby in Selden Creek (N41°24"32.7 W072°24"53.7), outside of the Selden Cove treatment area. An individual of *Orontium aquaticum* was observed east of Chapman Pond (N41°25" 59.5 W072°26"18.4; Fig. 7). This occurrence is positioned outside of the potential Chapman Pond treatment area.

Table 1. Survey sites and target aquatic plant species.

Site	Plant	State Status
Seldon Cove	Golden club (<i>Orontium aquaticum</i>) Awl-leaved arrowhead (<i>Sagittaria subulata</i>) Beck's water-marigold (<i>Bidens beckii</i>)	Special Concern Special Concern Special Concern
	Parker's pipewort (<i>Eriocaulon parkeri</i>) Small yellow pond lily (<i>Nuphar microphylla</i>) Torrey bulrush (<i>Schoenoplectus torreyi</i>)	Endangered Special Concern Threatened
Deep River (Trib)	Golden club (Orontium aquaticum)	Special Concern
Chapman Pond	Awl-leaved arrowhead (Sagittaria subulata) Torrey bulrush (Schoenoplectus torreyi)	Special Concern Threatended
Keeney Cove	Northern arrowhead (Sagittaria cuneata)	Threatened
Mattabesset River	Dwarf bulrush (Lipocarpha micrantha)	Threatened



Figure 1. Selden Cove. Top: Study Area; bottom: Low tide, with stranded Hydrilla



Figure 2. Sagittaria montevidensis ssp. spongiosa at Selden Cove.



Figure 3. Sagittaria subulata at Selden Creek (top/middle) and Selden Cove (bottom).



Figure 4. Observations (yellow circles) of Sagittaria subulata, 29 Aug 2023.



Figure 5. Deep River tributary. Top: Study Area; Middle: Zizania aquatica; Bottom: Hydrilla



Figure 6. Chapman Pond. Top: Study Area; Bottom: Dense Hydrilla verticillata



Figure 7. Orontium aquaticum observation (yellow circle) outside of Chapman Pond. 29 Aug 2023.



Figure 8. Keeney Cove. Top: Study Area; Bottom: Hydrilla and Trapa. 31 Aug 2023.



Figure 9. Mattabesset River. Top: Study Area; Bottom: exposed shore. 31 Aug 2023.

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		Hartfo	ord, CT 06106-5	127	
Submit survey forms, maps,	Plea: and all si	se complete thi upporting docu	is form to the be ments to the add	st of your ability. dress above or em	aail to deep.nddbrequest@ct.gov
*SPECIES SCIENTIFIC NAM	E: SAG	TTANIA	SUBVLATA	Element Oc	currence (EO) # (if known):
REPORTER INFORMATION	1996				
Name(s): DONALD P	ADGE	71			
Address: BMDGEWATEN	STAT	E UNIN.		Telephone No:	774-222-0101
BRIDGEWATER	L, M	A 0732	25	E-mail address:	DPADGETT@BMDGEW.ED
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Site Name: SELDEN	Cave	4		Survey Date(s):	8/29/22
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Directions to plant population, in	cluding be	est parking and a	access points. Plea	se attach a map wi	th boundaries drawn around observed
plant populations (or surveyed are	ea if plants	not found).			
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Estimated No./Range	20	10050			Area (units)
Evidence of disease, predation or	injury?	Yes No E	Explain:		
Phenology			Age Structure		Vigor
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% In flower bud	% Seed o	lispersing	% Imma	ture	Feeble
💋 % In flower	% Dorma	ant	% Matur	re (established)	Normal Vigorous
% Immature fruit	% Senes	cent	Age stru	cture unknown	Exceptionally vigorous
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Comments on above:					
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HABITA	Г				
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ΠE	ΠNW	3-8%	Partial	Upper Slope	Seasonally Inundated/Exposed
Πs	SE	8-15%	Filtered	Mid-Slope	Tidally Inundated/Exposed
Πw	⊡sw	15-35%	Shade	Lower-Slope	Saturated (Hydric)
Flat	104.6.5 555	35% - vertical		Bottom	Moist (Mesic)
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Soil/substr	rate name/desci	iption(give source):			
Estimated	# of acres of po	otential habitat in the imr	nediate area:		~/
Evidence	of disturbance:	fire logging	disease	insect damage 🗌 wind	throw invasives
Comments	S:				\sim
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	1				
Associate	d natural/plant	communities:			

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HYDRUCA		
Associated plant species (separated strata, e.g. tre	ee, shrub, herb layers):	

IDENTIFICATION	. /			
Photograph taken?	Yes	🗌 No	Photo ID:	
Specimen taken*	Yes	No	If yes, provide:	Collector:
с. 		-		Repository:
				Collection #:
Identification problems?	Yes	No	Explain:	

*DEP Scientific Collection Permit is needed to collect specimens

CONSERVATION	
Owner info:	
Owner aware of EO? Yes No Unknown	Owner protecting EO? Yes No Unknown
Threats to EO:	
Conservation/	
management needs:	
Research needs:	

SUPPORTING DOCUMENTS (please attach)

Sketch map (showing finer detail than topo or aerial photo)
 Aerial photo map
 Topographic map, or street or parcel map







Figure 4. Observations (yellow circles) of Sagittaria subulata, 29 Aug 2023.

	OFFICE USE ONL'	Y	EO#:	
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	TOWN:		ENTERED BY:	
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*SPECIES SCIENTIFIC NAME:	SAGITTANI /	A SUBULATA	Clement Occurrence (EO) # (if known):	
REPORTER INFORMATION				
Name(s): DONALD PAC	6577	1		
Address: BNIDGEVATEN	STATE UNIN	· Tele	phone No: 774-222-010	
SNIDGEWATEN, M	A 02325	E-m	ail address: DPADGETT @ BRINGEW. C	
SURVEY/SITE INFORMATION				
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Town(s): Lyme		Com	ty: NEVal Laval Ad	
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POPULATION DATA				
Population Size	What was counted	ed?	Population Area	
Actual No. Observed	(e.g. stems, clump	ps, floating masses, etc.	Length (units)	
Estimated No /Range	RUSE 114	S	Width (units)	
		Area (unite)		

Evidence of disease, predation or injury?
Yes No Explain:

Phen	ology		Age Structure	Vigor	
100	% In leaf	% Mature fruit	% Seedlings	Very feeble	
	% In flower bud	% Seed dispersing	% Immature	Feeble	
d	% In flower	% Dormant	% Mature (established)	Normal	
4	% Immature fruit	% Senescent	% Senescent		
	/o miniature muit	70 Selfescent	Age structure unknown	Exceptionally vigorous	

Area (units)

Comments on above:

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Associated natural/plant communities:

Associated plant species (separated strata, e.g. tree, shrub, herb layers):

IDENTIFICATION	- 1-			
Photograph taken?	Yes	🗌 No	Photo ID:	
Specimen taken*	Yes	No	If yes, provide:	Collector:
Speennen				Repository:
			-	Collection #:
Identification problems?	Yes	No	Explain:	

*DEP Scientific Collection Permit is needed to collect specimens

CONSERVATION		
Owner info:		
Owner aware of EO?	Yes 🗌 No 🗌 Unknown	Owner protecting EO? Ves No Unknown
Threats to EO:		
Conservation/		
management needs:		
Research needs:		

SUPPORTING DOCUMENTS (please attach)

Sketch map (showing finer detail than topo or aerial photo)

Aerial photo map

Topographic map, or street or parcel map

Cross section of topography/habitat (include scale, direction, element position, description, and sub-occurrence ID[s], if needed) Photos GPS/GIS data Field notes Route of survey map







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	OFFICE USE	ONLY		EO#:	
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	TOWN:		AL STREET	ENTERED BY:	
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REPORTER INFORMATI	ON				
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SURVEY/SITE INFORMA				~ 1 ~ 1 ~	
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ant populations (or surveyed	d area if plants not found)	and access points. Pl	ease attach a map	with boundaries drawn around observed	
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GPS Coordinates		Method Us	ed to Determine	Coordinates:	
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POPULATION DATA					
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Actual No. Observed	(e.g. stems,	ciumps, floating ma	sses, etc.)	Length (units)	

Comments on above:

Actual No. Observed

Estimated No./Range

Evidence of disease, predation or injury?
Yes No Explain:

CLUMP

Phenology			Age Structure	Vigor
00	% In leaf	% Mature fruit	% Seedlings	Very feeble
	% In flower bud	% Seed dispersing	% Immature	Feeble
ø	% In flower	% Dormant	% Mature (established) % Senescent	Normal
	% Immature fruit			
	/o miniature muit	76 Schescent	Age structure unknown	Exceptionally vigorous

Length (units)

Width (units)

Area (units)

HABITAT					
A: N E S W Flat	spect NE NW SE SW ° re true N ° re mag N	Slope 0-3% 3-8% 8-15% 15-35% 35% - vertical Measured (° or %): Horizontal shape (as for Vertical shape (ie. Control shape)	Light Open Partial Filtered Shade	Topographic Position Crest Upper Slope Mid-Slope Lower-Slope Bottom Other: aight, variable):	Moisture Permanently Inundated Seasonally Inundated/Exposed Tidally Inundated/Exposed Saturated (Hydric) Moist (Mesic) Dry-Mesic Dry-Xeric Other:
Elevation: Soil/subst Estimated Evidence Comment	to rate name/descr # of acres of po of disturbance: s:	feet meters iption(give source): otential habitat in the imp fire logging	mediate area: disease	insect damage 🗌 windtl	hrow 🗌 invasives
Associate	d natural/plant	communities:			

Associated plant species (separated strata, e.g. tree, shrub, herb layers):

HYDNILLA

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	1 No	Explain:	Conection #.
	Yes Yes	Yes No Yes No	Yes No Photo ID: Yes No If yes, provide:

*DEP Scientific Collection Permit is needed to collect specimens

CONSERVATION	
Owner info:	
Owner aware of EO?	Yes No Unknown Owner protecting EO? Yes No Unknown
Threats to EO:	
Conservation/	
management needs:	
Research needs:	

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