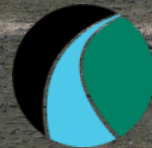


Mapping Invasive Plants in a Coastal Forest

Shelby Larubina, Cary Chadwick, Jason Krumholz & Julianna Barrett



CLEAR

Sea Grant
CONNECTICUT



UConn Center for Land Use Education and Research

Mission: To provide information and assistance to land use decision makers and other audiences in support of better land use decisions, healthier natural resources, and more resilient communities



Water



Land Use &
Climate Resiliency



Geospatial Tools &
Training



Food Systems



STEM Education &
Local Conservation



<https://clear.uconn.edu>

UConn CLEAR\CT NERR Webinar, 6/26/24



Webinar Overview

**Developing a rapid survey
approach to mapping
terrestrial invasive plants**



Introduction

About the Reserve & this project

Methods

EpiCollect app

Field approach

Results & Implications

Lessons learned & Next steps

Questions 😊

Webinar Overview

**Developing a rapid survey
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Questions 😊

But first... a poll!

Webinar Overview

**Developing a rapid survey
approach to mapping
terrestrial invasive plants**



With the support of a single GIS specialist and experienced botanist, students and staff new to plant identification utilized a mobile mapping app to survey the distribution and abundance of common invasive plants in two Southeastern CT state parks.

Developing a rapid survey approach to mapping terrestrial invasive plants



Photo: Wineberry | Credit: Shelby Larubina



Photo: Oriental Bittersweet | Credit: Shelby Larubina

National Estuarine Research Reserve System

A national network of 30 coastal sites designed to protect and study estuarine systems



What is a Research Reserve?

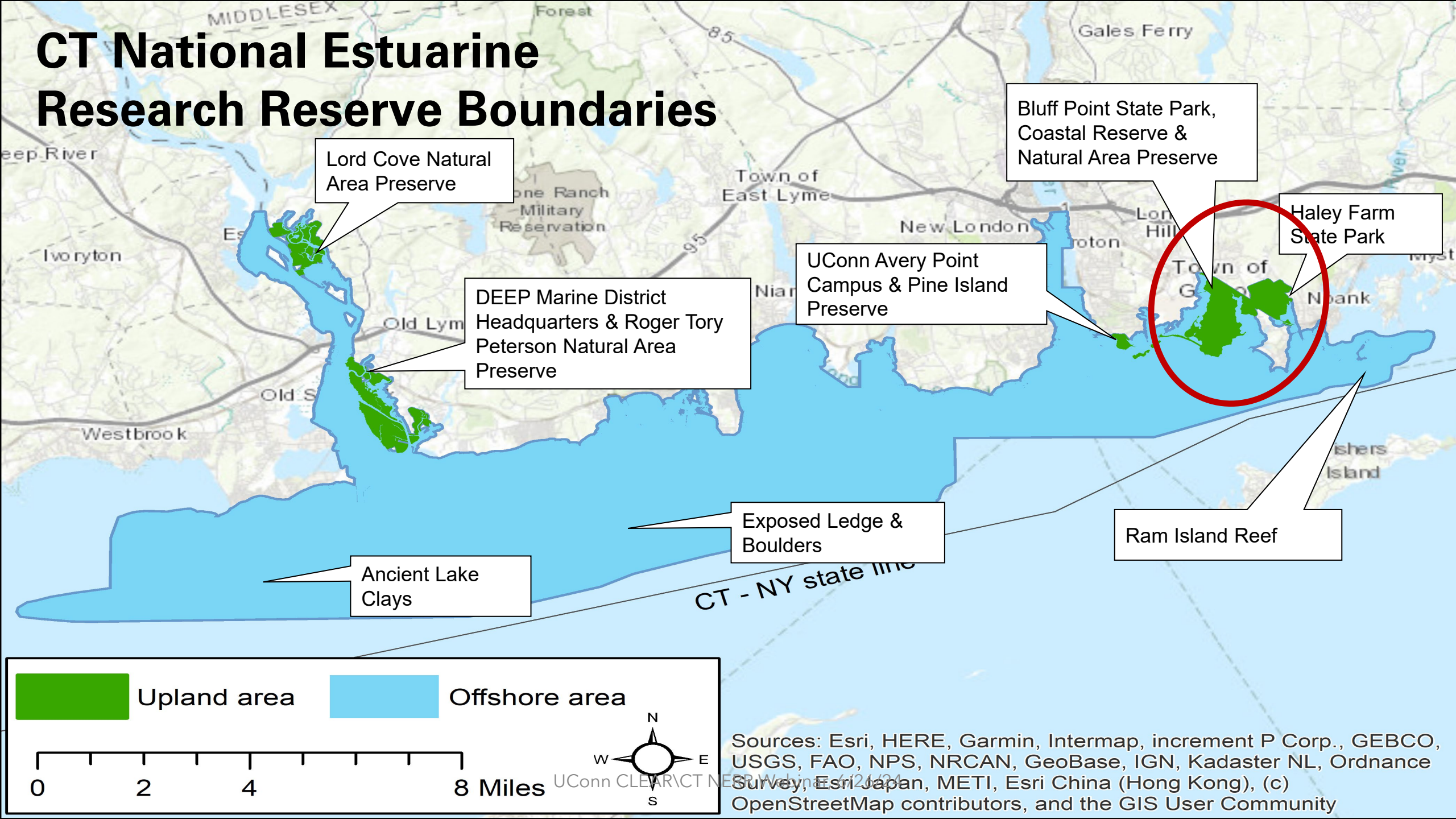
Provide protected coastal places for research, monitoring, education, and stewardship

Conduct work that is locally relevant and nationally significant

Address complex coastal issues through multi-disciplinary staff and partnerships

Tailor national programs to address priority coastal management issues

CT National Estuarine Research Reserve Boundaries



Lord Cove Natural Area Preserve

DEEP Marine District Headquarters & Roger Tory Peterson Natural Area Preserve

UConn Avery Point Campus & Pine Island Preserve

Bluff Point State Park, Coastal Reserve & Natural Area Preserve

Haley Farm State Park

Ancient Lake Clays

Exposed Ledge & Boulders

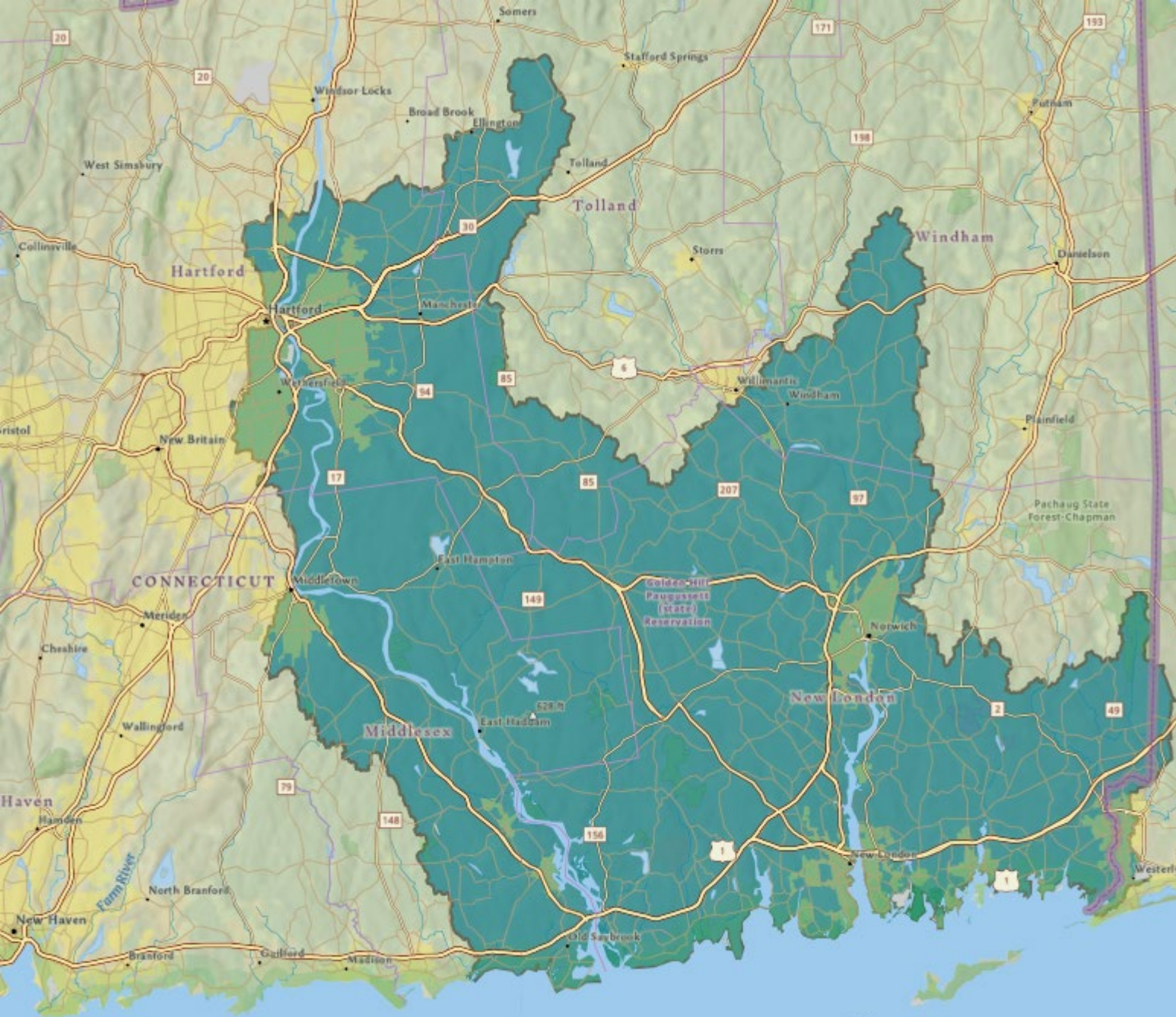
Ram Island Reef

Upland area **Offshore area**

0 2 4 8 Miles

A north arrow is located below the scale bar, with 'N' at the top, 'S' at the bottom, 'E' on the right, and 'W' on the left. The scale bar is marked with 0, 2, 4, and 8 miles.

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community



CT NERR Targeted Watershed Area



Connecticut National Estuarine Research Reserve

Mission Statement

To collaboratively integrate science with conservation, learning, recreation, and economic viability using ecologically diverse sites in southeastern Connecticut.

<https://estuarineresearchreserve.center.uconn.edu>

UConn CLEAR\CT NERR Webinar, 6/26/24

Project Team



Jason Krumholz

Stewardship Coordinator, CT NERR



Shelby Larubina

Research Technician, CT NERR



Cary Chadwick

Geospatial Educator, CLEAR



Julianna Barrett

Plant Ecologist, CTSG

Project Info and Goals

Funded by a 3 year ~\$300K IJA grant to the Reserve

Develop & implement a methodology:
1) rapid invasive surveys 2) lightly trained staff/volunteers
3) targeted professional support

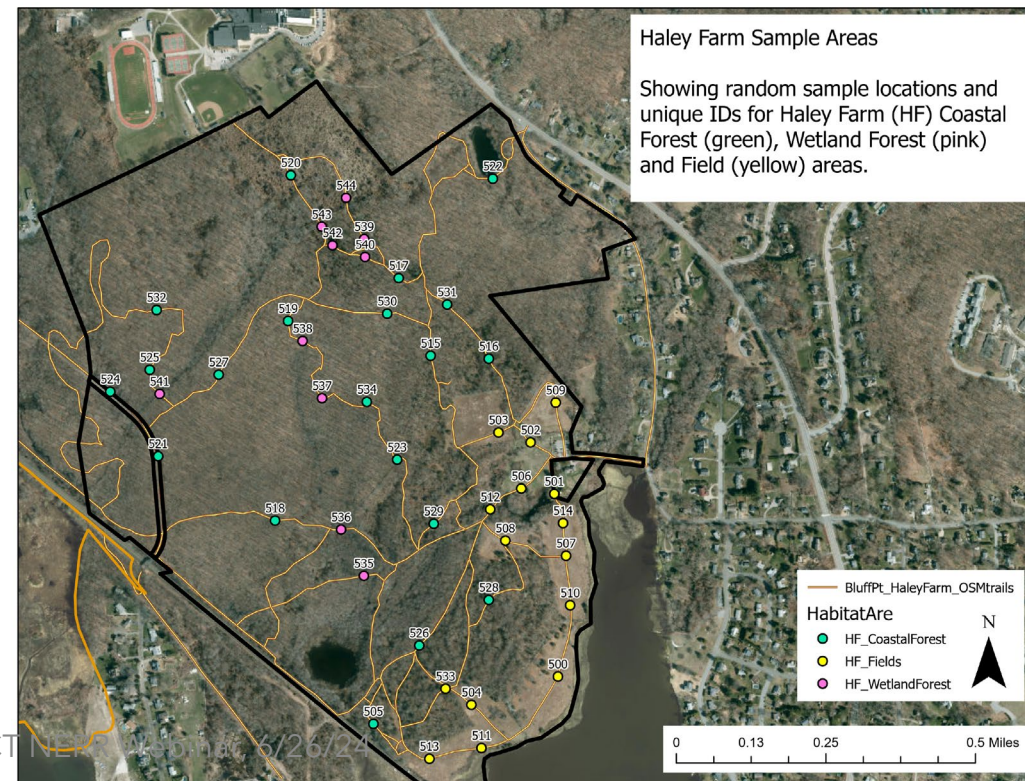
Build capacity by implementing a knowledge base and data storage protocols to facilitate future work

Provide a starting ground for future more focused study and invasive species management plans in Reserve properties

Developing a Field Mapping Protocol



252 sample locations across two sites
Bluff Point State Park and Preserve (204)
Haley Farm State Park and Preserve (48)



Random Field Sites

- Random point generation along footpaths, beaches, and bluffs
- Authorized and unauthorized trails




- GPS Field Sample Locations
- Authorized State Park Trails
- Unauthorized Trails (OSM)

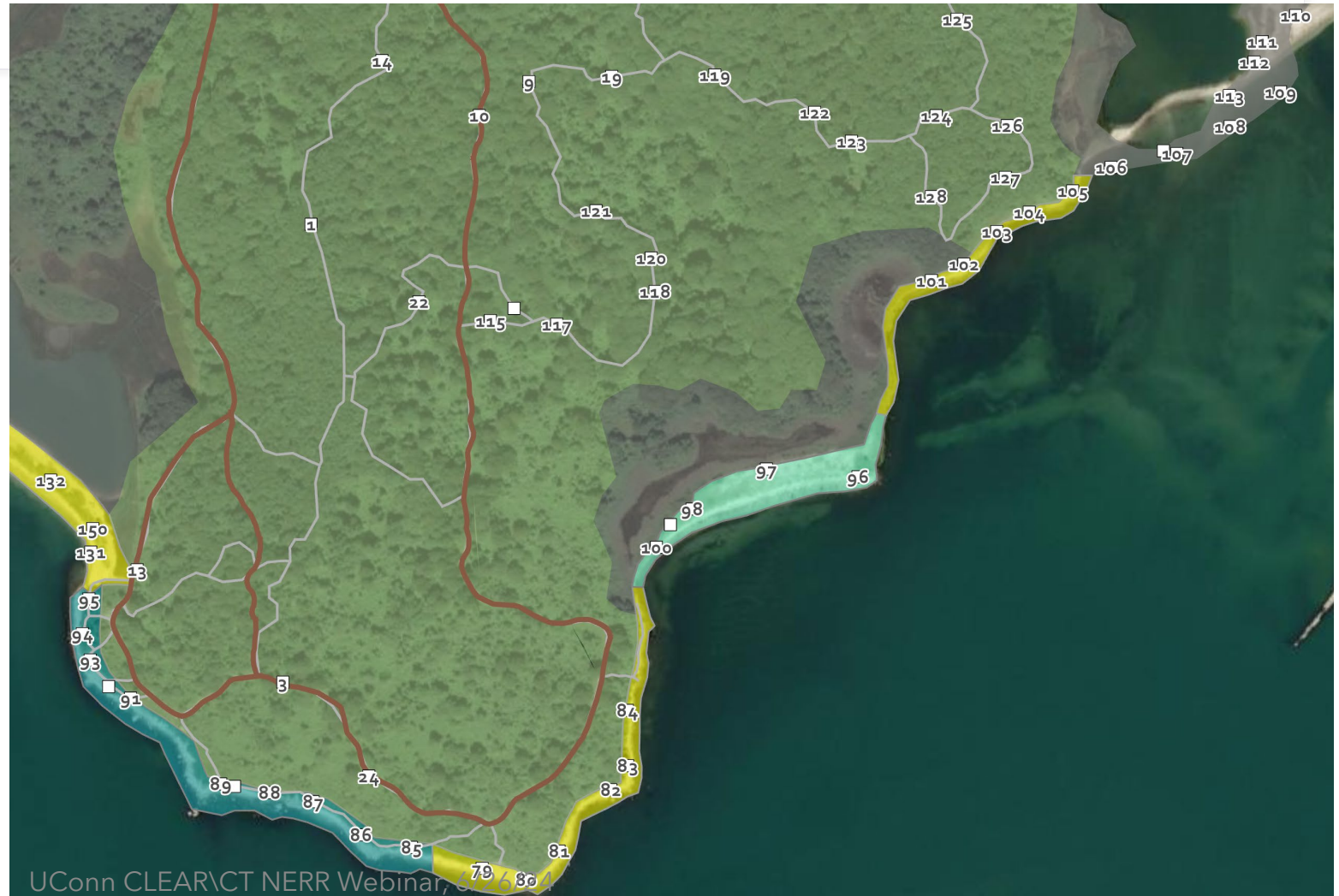


Random Field Sites

- Identification of unique habitat areas
- 100m transects in coastal forest

Bluff Point Habitat Areas

-  Beach
-  Coastal Bluffs
-  Coastal Forest
-  Coastal Forest Edge
-  Homestead Area
-  Sand Flats





GIS to GPS

- GIS data converted to .gpx file and loaded onto hand-held GPS receivers
- GPS receivers used to navigate to sites
- Data collected via data sheets & smartphone mapping app



Poll Question

Have you used a smartphone app to collect field data?

Yes*

No

*feel free to add the name of the app in the chat

Methods – Epicollect5

- Free app for iOS and Android devices
- Used in combination with paper field forms
- Form based data entry tool. Collects GPS location, multiple photographs, list of observed species
- Simple interface, no accounts necessary, form can be private/hidden from public
- Offline data collection



<https://five.epicollect.net/>

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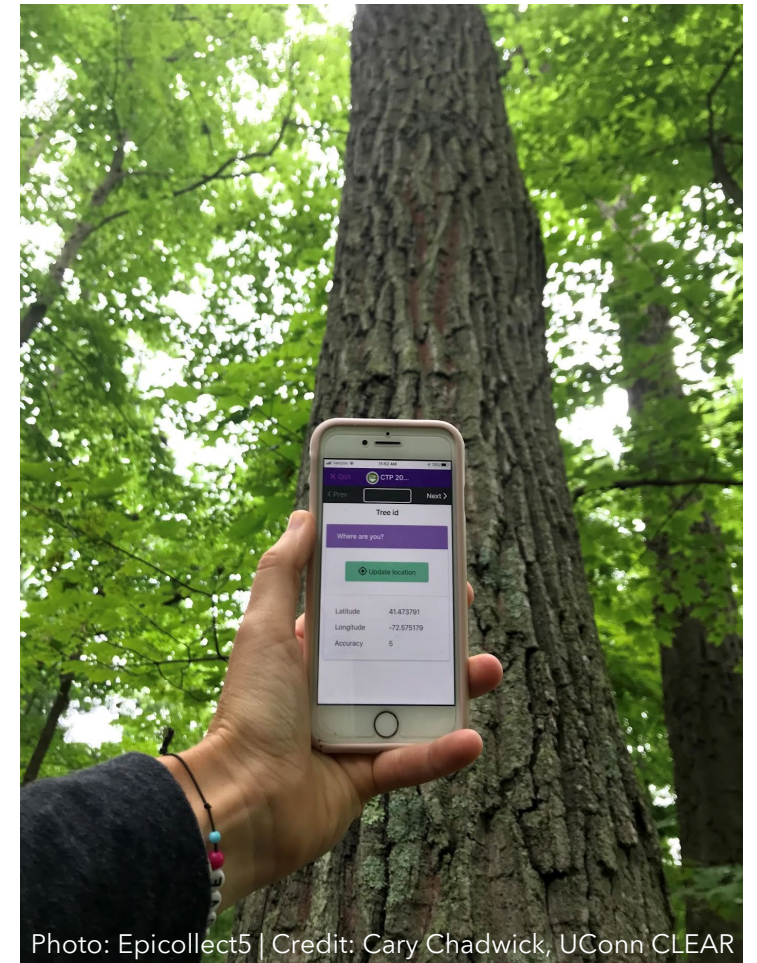
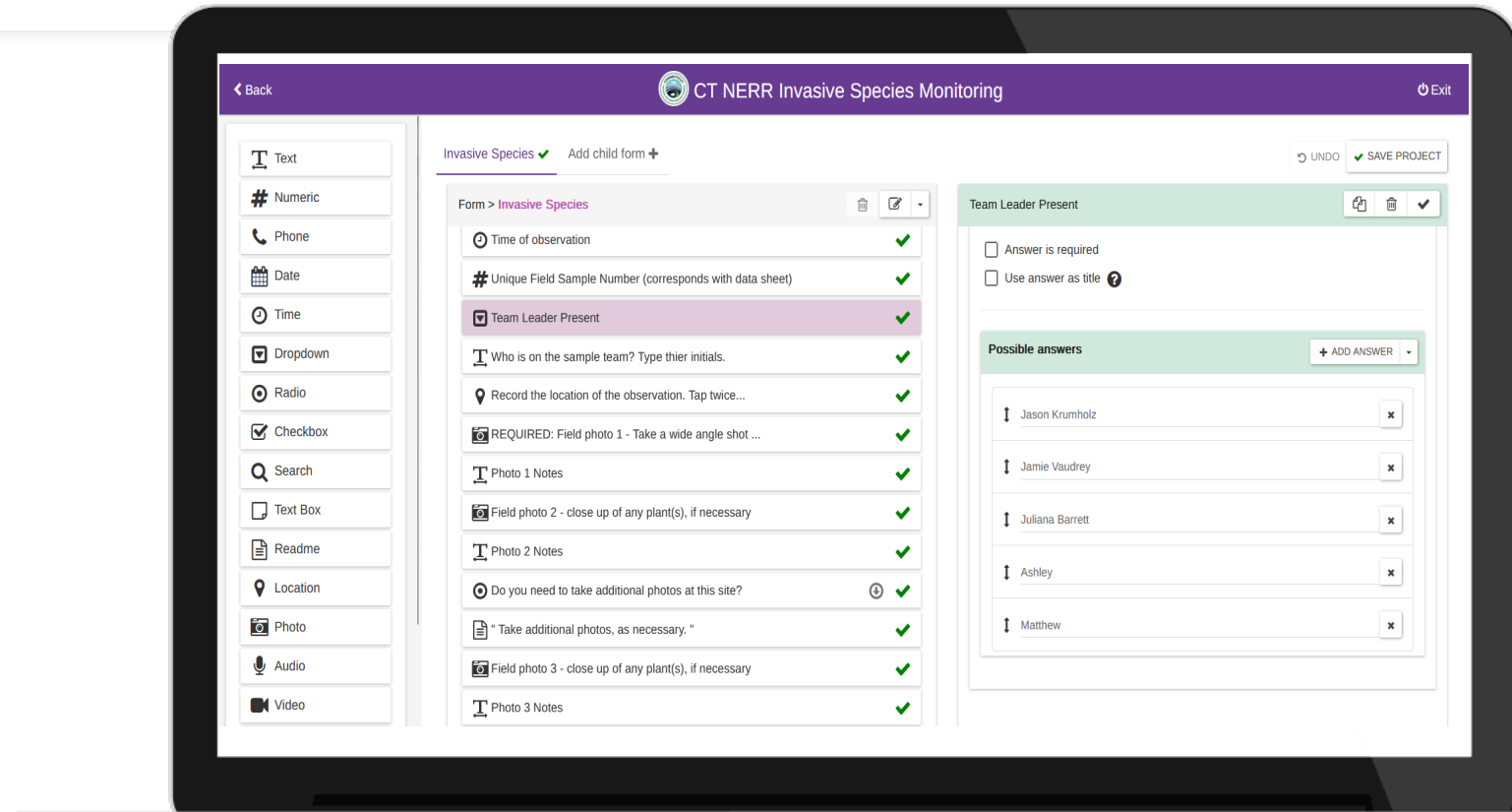


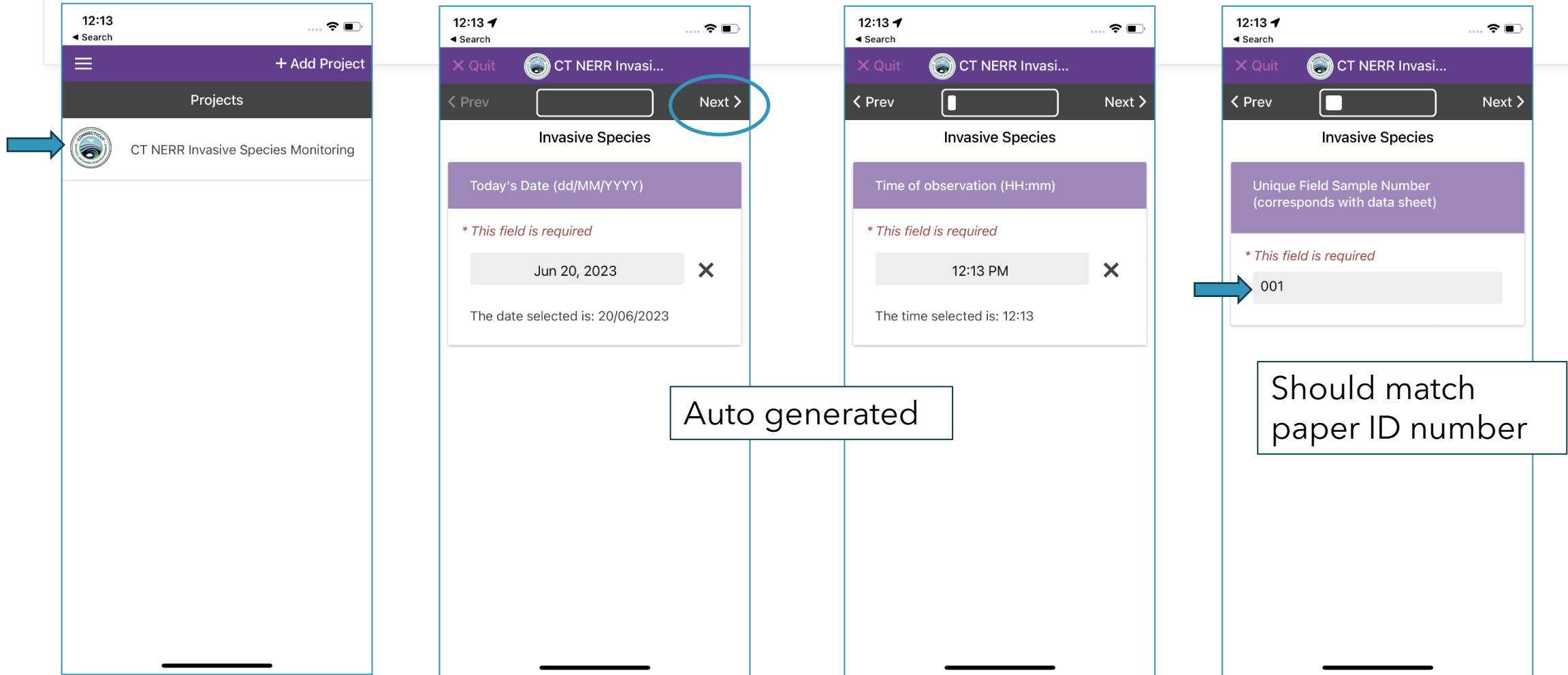
Photo: Epicollect5 | Credit: Cary Chadwick, UConn CLEAR

Epicollect5 FormBuilder

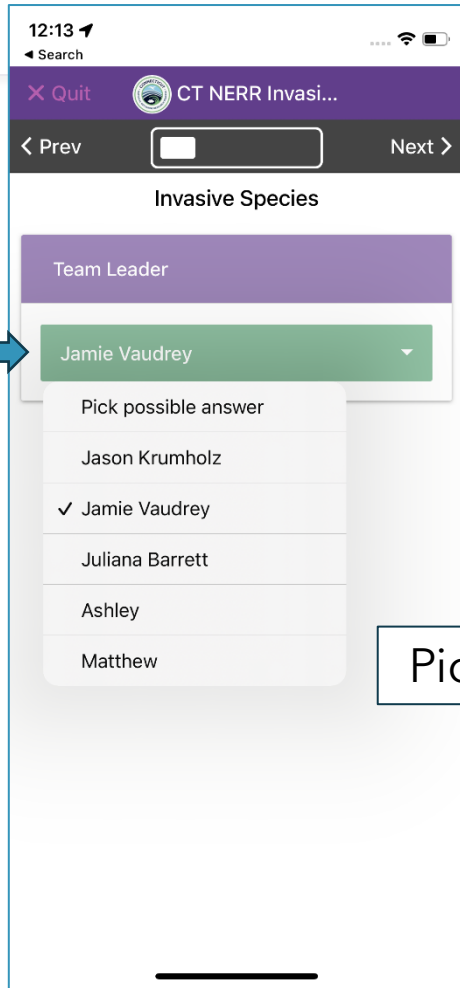
Bluff Point Invasive Species Mapping - Point Samples													Date:					
People (W=writing, I=plant ID, G=GPS)						Geodetic Datum (circle one)				Epicollect?								
Habitat (refer to sheet of options)						NAD 83 WGS 84 NATRF2022												
GPS N (dec. deg.)																		
GPS W (dec. deg.)																		
Species	coverage				certainty			coverage				certainty						
	present	single	many	all	overgrown?	flowering	certain	tentative	check	present	single	many	all	overgrown?	flowering	certain	tentative	check
<i>Aegopodium podagraria</i> , Bishop's Weed																		
<i>Alliaria petiolata</i> , Garlic Mustard																		
<i>Anemisia vulgaris</i> , Mugwort																		
<i>Candollea imrayensis</i> , Narrowleaf Bittersweet																		
<i>Euphorbia cyparissias</i> , Cypress Spurge																		
<i>Heracleum mantegazzianum</i> , Japanese Knotweed																		
<i>Polygonum cuspidatum</i> , Japanese Knotweed																		
<i>Polygonum perfoliatum</i> , Mile-a-minute Vine																		
<i>Valeriana officinalis</i> , Garden Heliotrope																		
<i>Phragmites australis</i> , Common Reed																		
<i>Celastrus orbiculatus</i> , Oriental Bittersweet																		
<i>Lonicera japonica</i> , Japanese Honeysuckle																		
<i>Berberis thunbergii</i> , Japanese Barberry																		
<i>Elaeagnus umbellata</i> , Russian Olive																		
<i>Elaeagnus umbellata</i> , Autumn Olive																		
<i>Euonymus alatus</i> , Burning Bush																		
<i>Ligustrum obtusifolium</i> , Border Privet																		
<i>Lonicera spp.</i> , Shrub Honeysuckles																		
<i>Rosa multiflora</i> , Multiflora Rose																		
<i>Rosa rugosa</i> , Beach rose																		
<i>Rosa blanda</i> , Norway Maple																		
<i>Acer pseudoplatanus</i> , Sycamore Maple																		
<i>Allanthus altissima</i> , Tree of Heaven																		
<i>Robinia pseudoacacia</i> , Black Locust																		



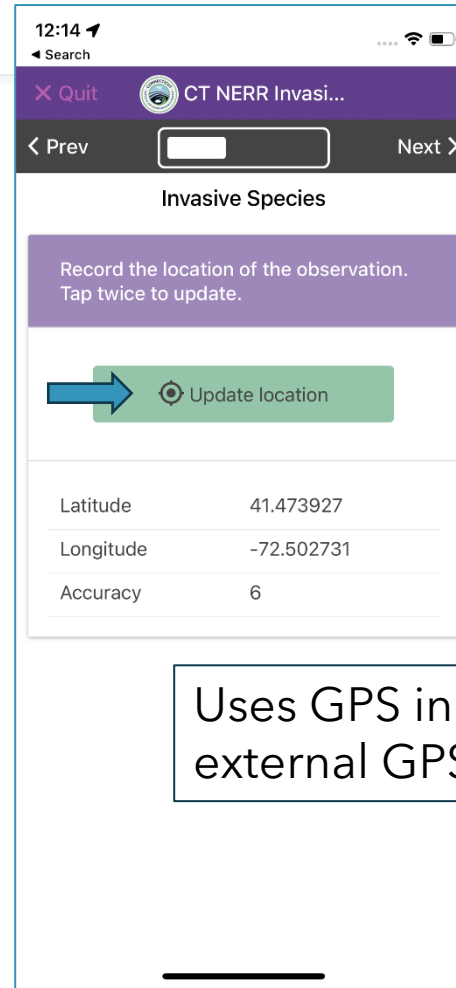
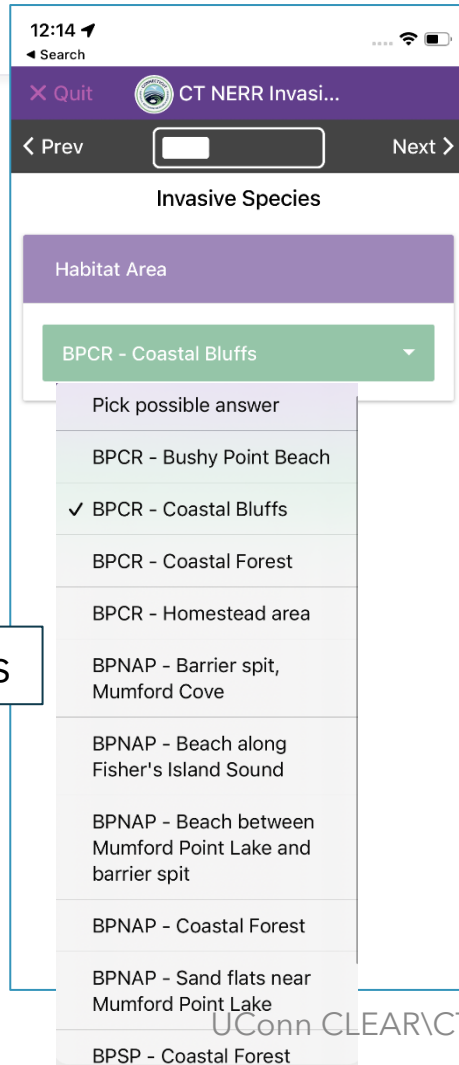
App interface



App interface

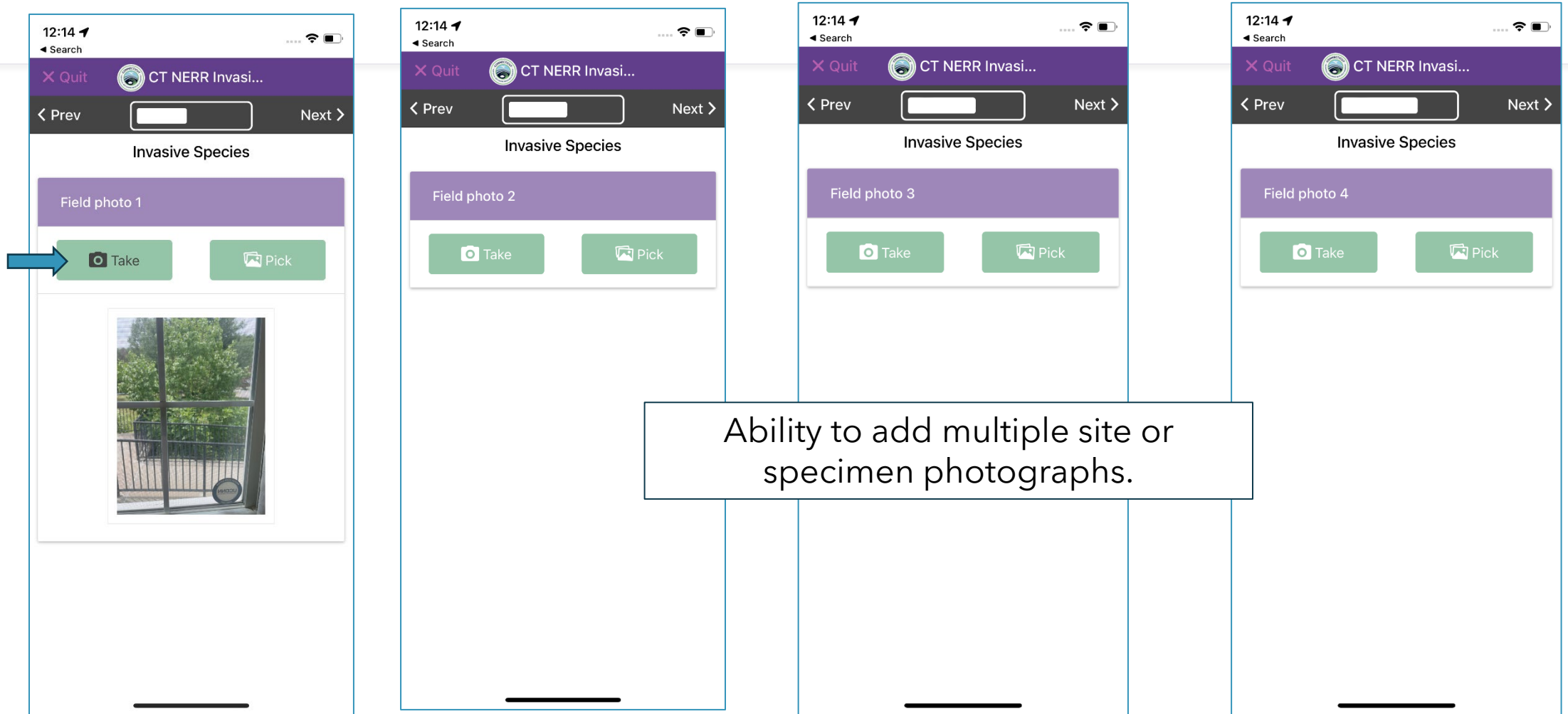


Pick lists



Uses GPS in device or can connect to external GPS via Bluetooth.

App interface



App interface

12:14

Search

Quit CT NERR Invasi...

Prev Next

Invasive Species

Species present (check all that apply)

- Aegopodium podagaria, Bishop's Weed
- Alliaria petiolata, Garlic Mustard
- Artemisia vulgaris, MugWort
- Cardamine impatiens, Narrowleaf Bittercress
- Euphorbia cyparissias, Cypress Spurge
- Heracleum mantegazzianum, Giant Hogweed
- Polygonum cuspidatum, Japanese Knotweed

12:15

Search

Quit CT NERR Invasi...

Prev Next

Invasive Species

Observation confidence level

certain

tentative ✓

requires additional check

12:15

Search

Quit CT NERR Invasi...

Prev Next

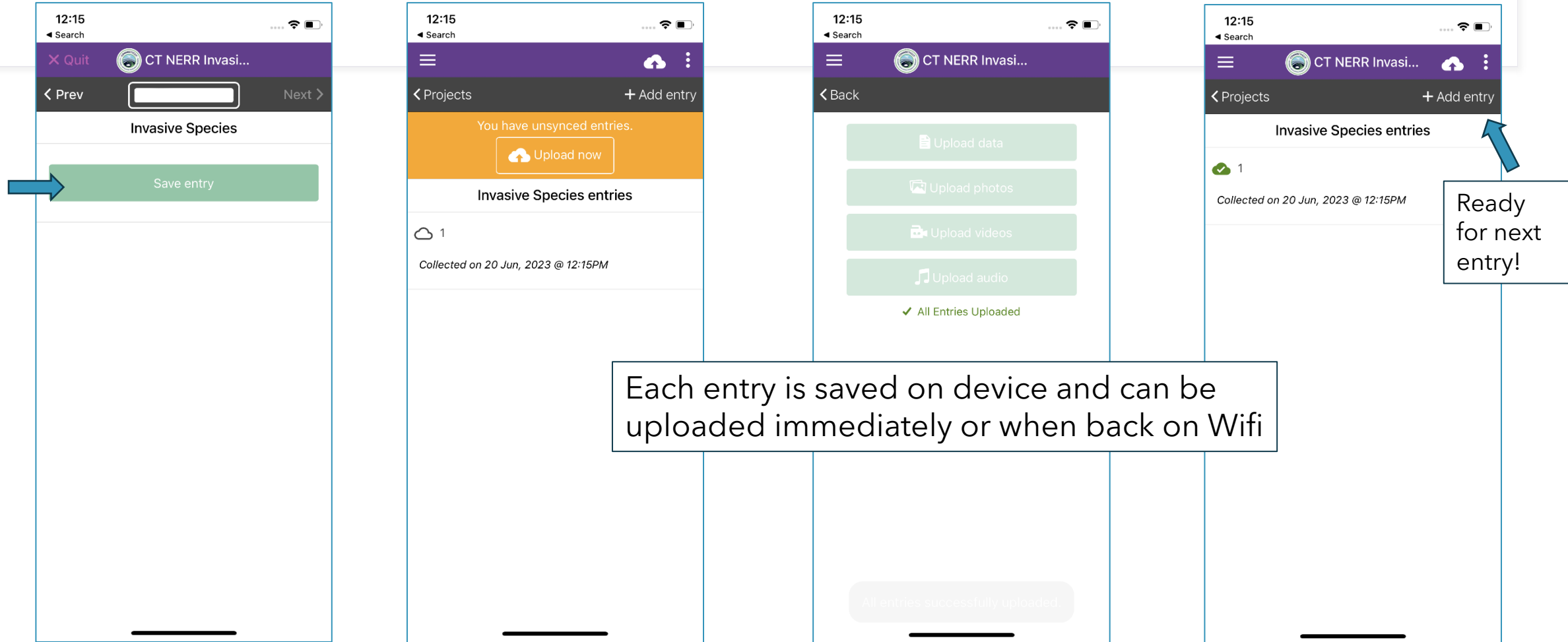
Invasive Species

General Notes or Observations

Type answer here...


Can add additional form questions if necessary

App interface



Viewing Data on Epicollect Website

Hi, Cary My Projects Create Project Find Project



CT NERR INVASIVE SPECIES MONITORING

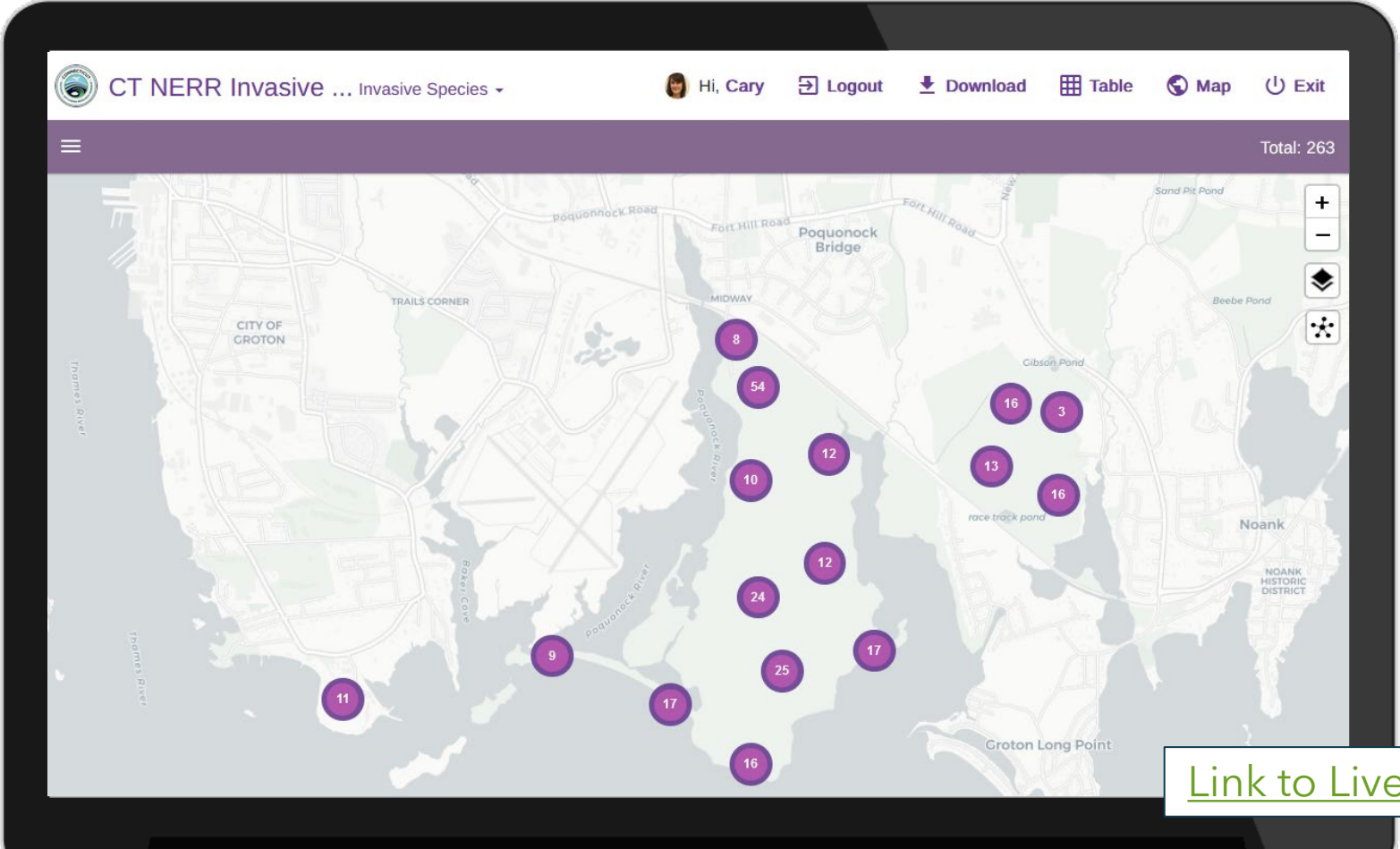
Invasive plant inventory across several CT NERR sites. V2.

270 ENTRIES LAST ON: 18 JUN 24

DETAILS VIEW DATA

A digital field data collection form to supplement invasive plant sampling across several CT NERR sites.

Entries uploaded to web.
Table and map view.



CT NERR Invasive ... Invasive Species

Hi, Cary Logout Download Table Map Exit

Total: 263

Map view showing sites: Thomas River, Trails Corner, City of Groton, Baker Cove, Poquonock River, Midway, Poquonock Bridge, Fort Hill Road, Sand Pit Pond, Beebe Pond, Gibson Pond, race track pond, Noank, Groton Long Point.

[Link to Live View](#)

Epicollect Website

- Filter and sort data
- Download subset or all to Excel
- Generated species richness and density maps in ArcPro

Filters <

Location

RECORD THE LOCATI... ▾

Timeline RESET


20 Jun, 23 to 20 Jun, 23








○

Distribution RESET

SPECIES PRESENT (... ▾

Filtered total: 4



 Aegopodium podagaria, Bishop's Weed	1
 Alliaria petiolata, Garlic Mustard	0
 Artemisia vulgaris, Mugwort	1
 Cardamine impatiens, Narrowleaf Bittercress	1
 Euphorbia cyparissias, Cypress Spurge	0
 Heracleum mantegazzianum, Giant Hogweed	0
 Polygonum cuspidatum	1

Download <

Mapping

EC5_AUTO ▾

Timeframe

LIFETIME ▾

Format

CSV JSON

DOWNLOAD

Entries can be filtered and downloaded.



Field Approach

Prior to starting, students were introduced to plant identification using:

- Field guides
- Seek & iNaturalist
- Practice!

Goal was to be comfortable with the most common species, list contained 28 total



Field Approach

Groups navigated to a station using GPS & park maps

Recorded:

- presence/absence
- photos of the station or plants if needed
- Notes on any unknown or tentative plant ID

Field Approach

Of the species present, semi-quantitative measurements of abundance were recorded on a rank scale

(1) Single (2) Few (3) Many (4) Overgrown

Didn't use a strict spatial protocol (e.g. quadrat) in terms of the area considered "within" a station

Field Approach

Once groups completed recording, they waited for a team leader with more plant ID experience to verify the observations before moving to the next station

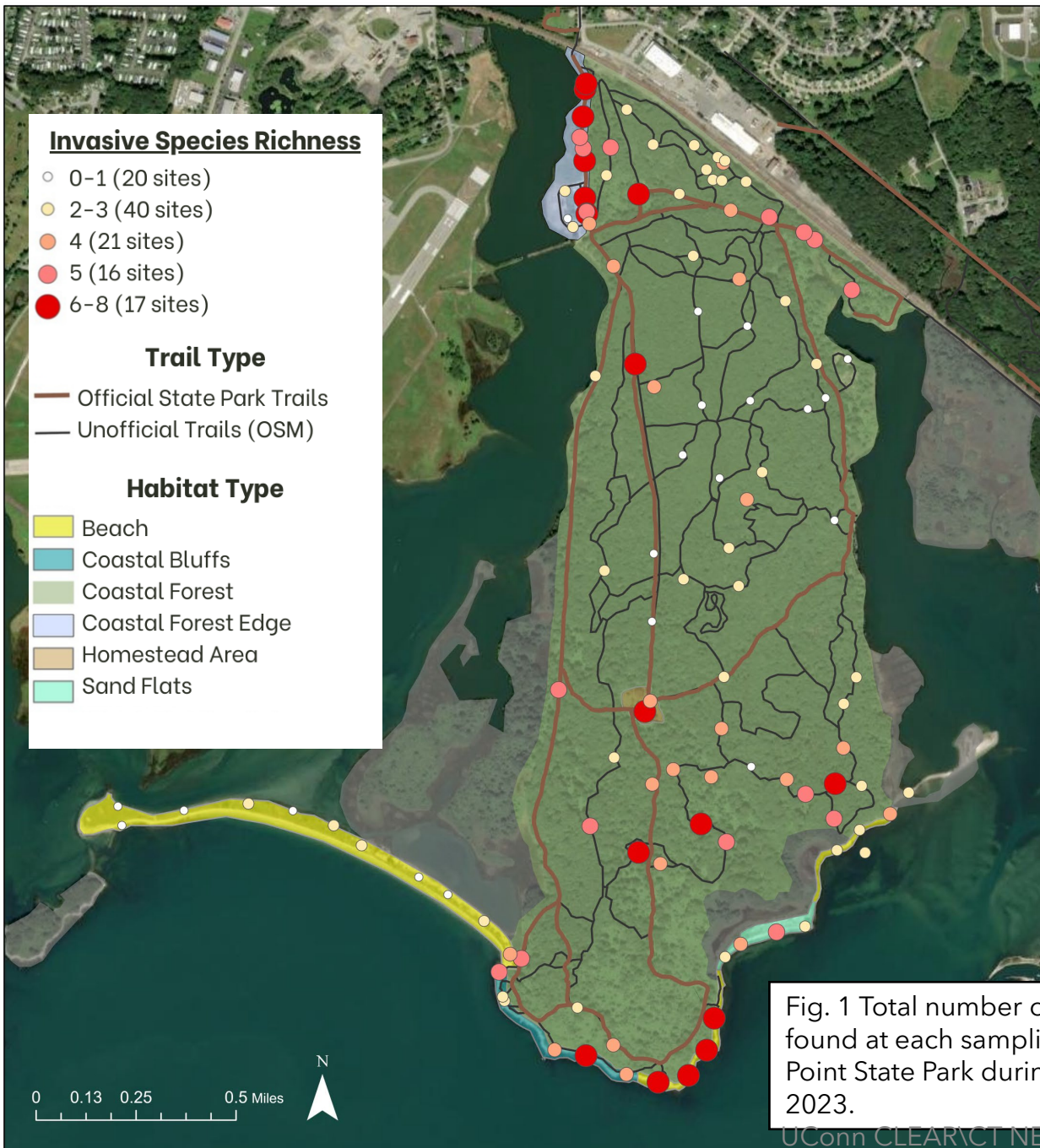
- 2-3 team leaders
 - 3-4 student groups at a time
- Efficient and effective method to cover a lot of ground with good reproducibility/agreement





With this rapid survey approach, we effectively sampled over 150 sites across two state parks in two months

Results



Invasive species richness was higher in more disturbed habitats

- Coastal Forest Edge (parking lot)
- Coastal Bluffs (scenic viewpoint)
- Trail junctions

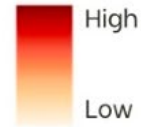
Confirming distribution and abundance trends with transects this summer

Results

Understanding the spread and geographic distribution of invasive plants can help **identify patterns of invasion** and **inform management priorities** for targeted and successful removal.

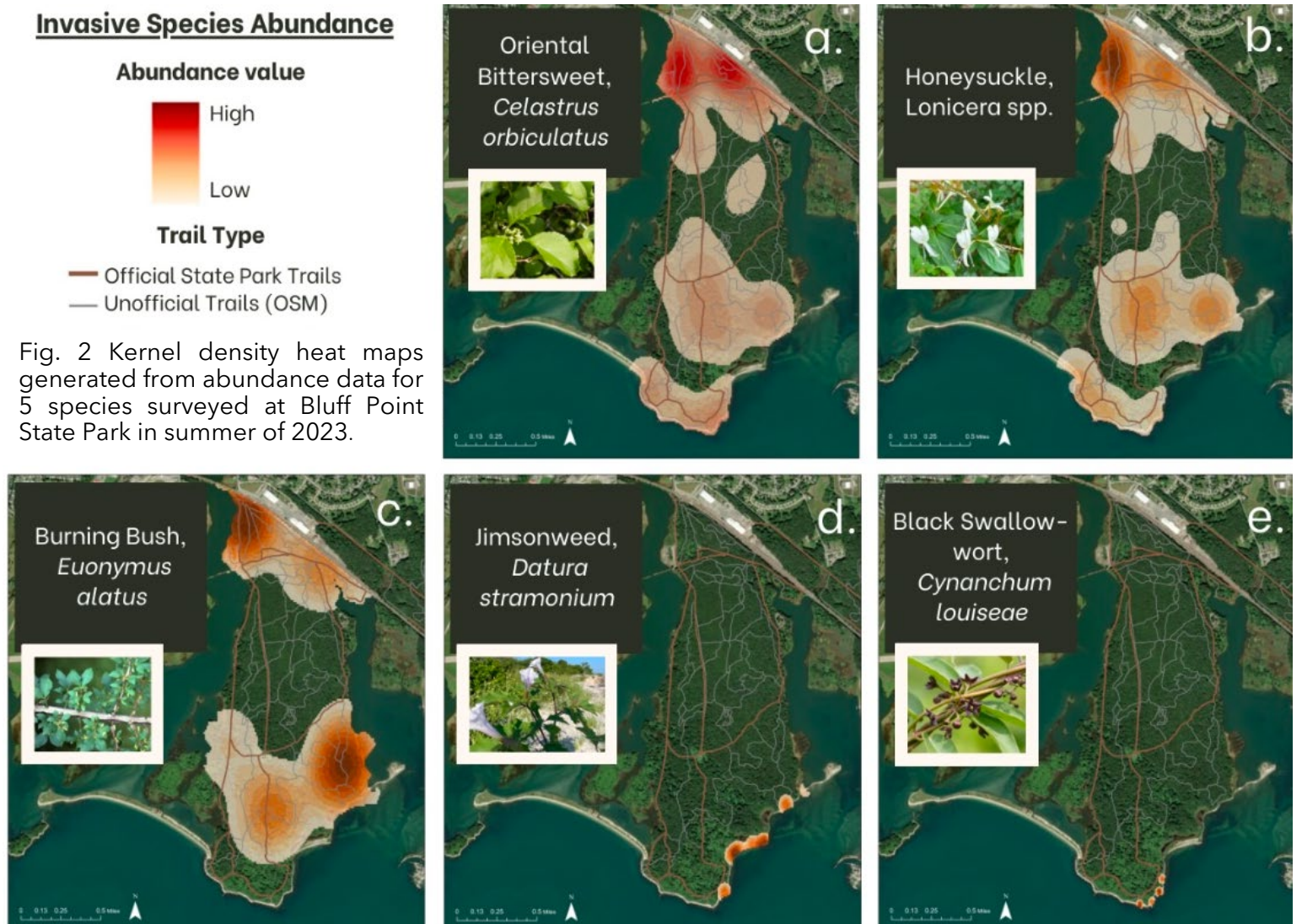
Invasive Species Abundance

Abundance value



Trail Type

- Official State Park Trails
- Unofficial Trails (OSM)



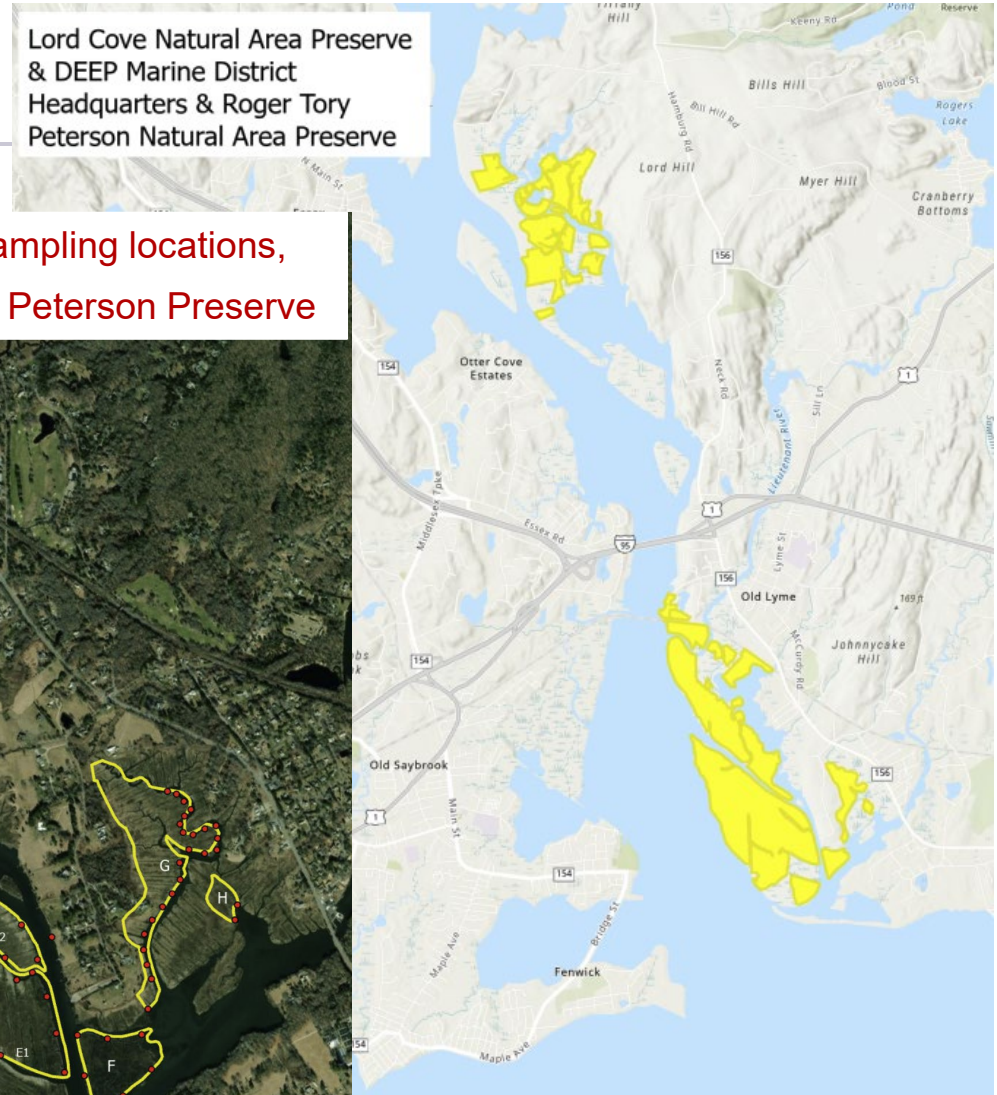
Key Points & Lessons Learned

- Epicollect5 was an effective survey tool for photo and data storage
- Survey techniques are highly transferable
- Our method identified hotspots of invasives in **highly-trafficked** areas and **bright sun**
- Results can help connect with community organizations to promote sustainable use
- Approach provides insight into patterns of invasion and priorities for effective management



Next Steps

- Complete transect surveys and analysis at Bluff Point & Haley Farm
- Identify scope of field work at Roger Tory Peterson and Lord Cove preserves
 - Preliminary field surveys in summer 2024
 - Full effort in summer 2025
- Incorporate results & lessons learned into outreach materials & future grant cycles



DRAFT sampling locations,
Roger Tory Peterson Preserve



Questions? Interested in a site visit?

More info:

shelby.larubina@uconn.edu | jason.krumholz@uconn.edu | cary.chadwick@uconn.edu



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