Mapping Invasive Plants in a Coastal Forest

Shelby Larubina, Cary Chadwick, Jason Krumholz & Julianna Barrett
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.
Webinar Overview

Developing a rapid survey approach to mapping terrestrial invasive plants
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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 😊
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But first… a poll!
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
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

Photo: Red-winged Blackbird - Sure Sign of Spring | Credit: Corey Leamy. www.flickr.com/photos/ctnerr/ (CC BY-NC 2.0)
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
- Ancient Lake Clays
- Exposed Ledge & Boulders
- Haley Farm State Park
- Bluff Point State Park, Coastal Reserve & Natural Area Preserve
- Ram Island Reef

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

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# Project Team

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<tr>
<th>Name</th>
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Project Info and Goals

Funded by a 3 year $300K IIJA 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
Random Field Sites

• Identification of unique habitat areas
• 100m transects in coastal forest
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/](https://five.epicollect.net/)
Epicollect5 FormBuilder

https://five.epicollect.net/

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App interface

Auto generated

Should match paper ID number
App interface

Pick lists

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

Ability to add multiple site or specimen photographs.
App interface

Can add additional form questions if necessary
Each entry is saved on device and can be uploaded immediately or when back on Wifi.

Ready for next entry!
Viewing Data on Epicollect Website

Entries uploaded to web. Table and map view.
Epicollect Website

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

Fig. 2 Kernel density heat maps generated from abundance data for 5 species surveyed at Bluff Point State Park in summer of 2023.
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
Questions? Interested in a site visit?

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More info: