



Monitoring at Your Fingertips

Nivette M. Pérez-Pérez, Manager of Community Science



DELAWARE
CENTER FOR THE
INLAND BAYS

preserve • protect • restore

Thank you - Co-Creators!

Center

- Meghan Noe Fellows
- Melina Vella
- Andrew McGowan

University of Delaware

- Nicole Minni
- Ambre Crawford

Volunteers

- Jodi Mclaughlin
- Bill MacLachlan
- Many dedicated volunteers

State Liaisons

- Jon Regosin, MA
- Mike Jones, MA
- Mike Ravesi, CT
- Chris Thawley, RI
- Lisa Pipino, NY
- John Butler, NY
- Brian Zarate, NJ
- Nate Nazdrowicz, DE
- Meagan Thomas, VA
- Beth Schlimm, MD
- Jordan Brown, DE

Consultant

- Patricia Levasseur



Why Transfer to Digital Monitoring Tools?

- Accessibility
- Protocol Reinforcement
- Live Data Observation
- QA/QC Quality Assurance

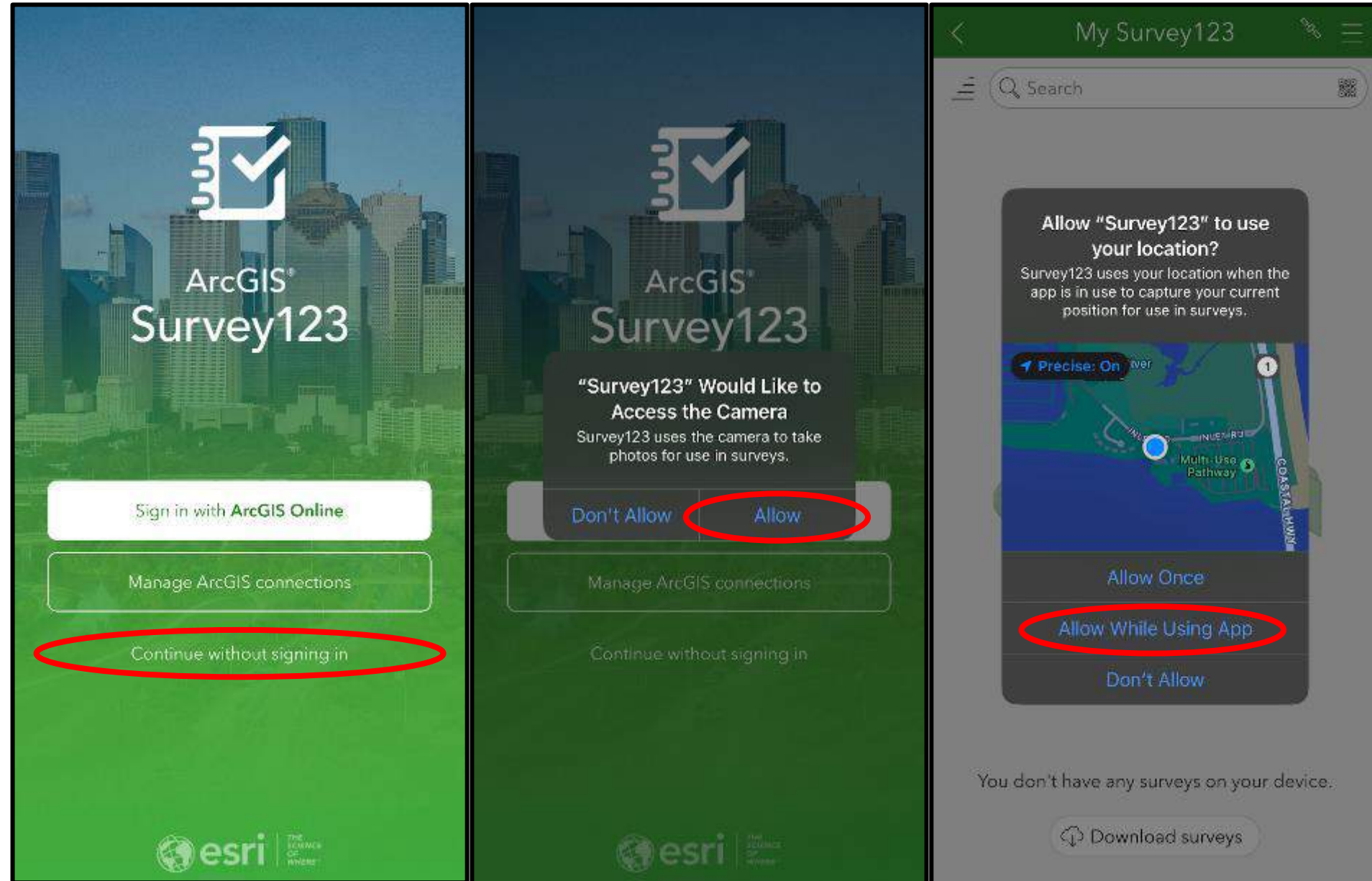
Why ArcGIS Survey123?



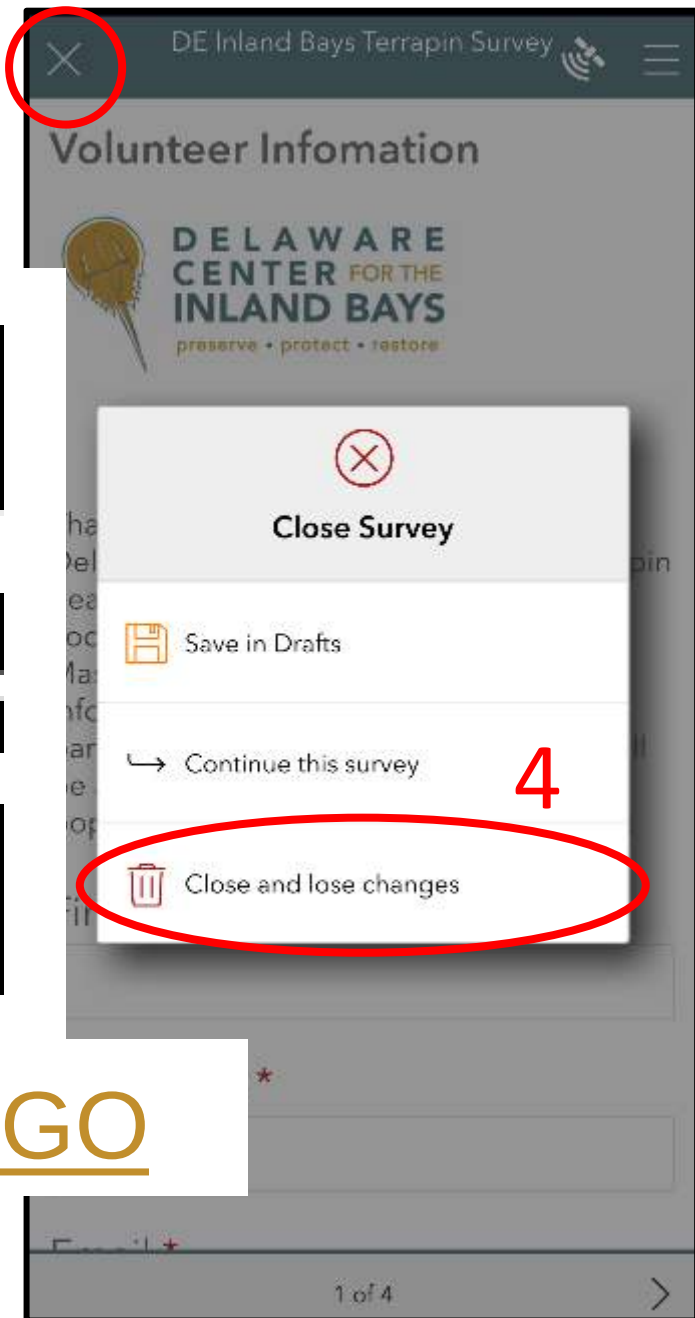
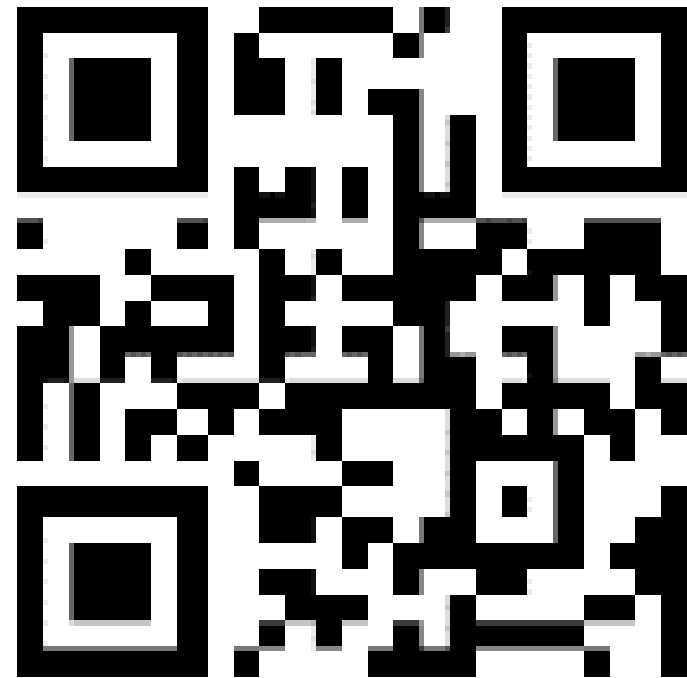
eBird



Open the ArcGIS Survey123 App



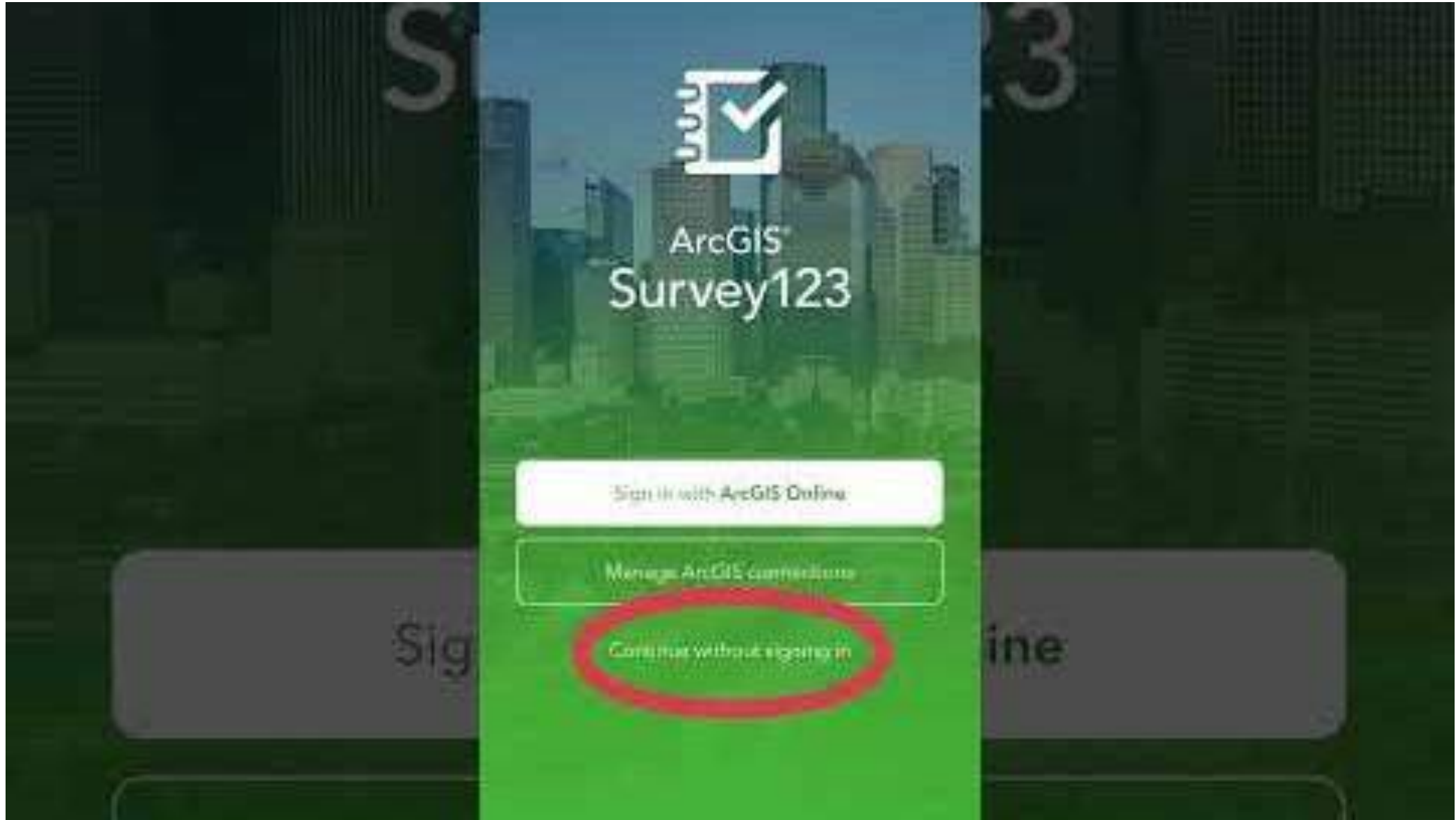
Download the Delaware Inland Bays Terrapin Survey



<https://arcg.is/rT5GO>

ArcGIS Survey123 Tutorial

<https://youtu.be/7yPZTKB6R3M>





Participatory Science Projects & Others

- Osprey Survey (2025)
- Diamondback Terrapin Survey (2025)
- CIB, I Need a Tree! (2025)
- NE Terrapin Watch (2026)
- Oyster Gardening (2026)
- MyCoast Delaware (2025-?)

PARTICIPATORY SCIENCE

QR CODES



NE Regional
Terrapin Watch



CIB, I Need a Tree!



Diamondback
Terrapin Survey



Oyster Gardening

HOW TO ACCESS?

1

Download the ArcGIS Survey123 app



2

Open app and click "Continue without signing in"

3

Scan the QR code using the button in the search bar and start reporting!

Terrapin Survey





Diamondback Terrapin

Malaclemys terrapin

- Only true estuarine turtle in North America
- Multiple natural and anthropogenic pressures
- In DE terrapins are listed as a “Species of Greatest Conservation Need Tier 1”
- We don’t have much data on terrapin populations in the Inland Bays or Delaware
- Surveys allow us to learn about population size, changes, and distribution over time



Abundance and Distribution

The Center began an Inland Bays Terrapin Survey in 2020.

We have worked with participatory scientists to create 12 land locations to observe terrapins from static points and 10 water trails to observe terrapins in the water (general points inaccessible by land).

Lessons learned from our pilot study are applied to . . .

co-created with Andrew McGowan, former
Manager of Environmental Science at the Center

Protocol Standardization

In 2023, the Center was awarded by the Northeast Association of Fish and Wildlife Agencies (NEAFWA) and Wildlife Management Institute (WMI) under the Regional Conservation Need (RCN) 3.0: Coordinated Assessment of the Northeastern Diamond-backed Terrapin Populations to Standardized Terrapin Population Assessment.

Which allowed to continue the work with modifications to:

- Seasonality
- Frequency of surveys
- Volunteer recruitment and training
- Flexibility in weather conditions
- Method and timing of observations

Northeast Diamondback Terrapin Survey

from May 1st to October 31st

Volunteers are encouraged to complete as many surveys as possible at any point during the survey period, with a **minimum** described in the timeline below

at the same land-based locations as the Center's survey

Timeline	Suggested Number of Surveys
May 1st- June 30th	3 surveys per site
July 1st- August 31st	1 survey per site
September 1st- October 31st	1 survey per site

Terrapin Survey Sections

Volunteer Information & Liability Waiver

**Asterisk shows required fields*

 DE Inland Bays Terrapin Survey  

Volunteer Information



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Thank you for participating in the annual Delaware Inland Bays Diamondback Terrapin headcount! This survey is part of a coordinated effort from Virginia to Massachusetts to record the same information throughout the range. By participating in this survey together, we will be able to paint a picture of this species' population status in the Northeast Region!

First Name *

Last Name *

  1 of 4 

Terrapin Survey Sections

Time, Weather, & Location

- Wind force
- Wind speed
- Temperature
- Cloud coverage
- Equipment
- Location

The screenshot shows a mobile application interface for the 'DE Inland Bays Terrapin Survey'. At the top, there is a dark header bar with a close button (X), the title 'DE Inland Bays Terrapin Survey', and icons for signal strength and a menu. Below the header, the section 'Time & Weather' is displayed. Under this section, there is a 'Date & Start Time' heading followed by a note: 'Note that time at which you are starting the survey.' Below the note are two input fields: 'Date' with a calendar icon and 'Time' with a clock icon. Further down, there is a 'Weather Conditions' section with a downward arrow icon. This section contains the question 'What is the wind force?' followed by instructions: 'Use the table above. If the conditions are windier than 3 – Gentle Breeze, select other.' Below this is a dropdown menu. At the bottom of the weather section, there is a note: 'For the following questions, please use the nearest DEOS weather station.' followed by a blue hyperlink: 'Click here to find the closest weather station.' Below the weather section, the text 'Sustained wind speed' is visible, followed by another instruction: 'Use the nearest DEOS weather station.' At the very bottom of the screen, there is a navigation bar with a back arrow, the text '2 of 4', and a forward arrow.

DE Inland Bays Terrapin Survey

Time & Weather

Date & Start Time

Note that time at which you are starting the survey.

Date

Time

Weather Conditions

What is the wind force?

Use the table above. If the conditions are windier than 3 – Gentle Breeze, select other.

For the following questions, please use the nearest DEOS weather station.

[Click here to find the closest weather station.](#)

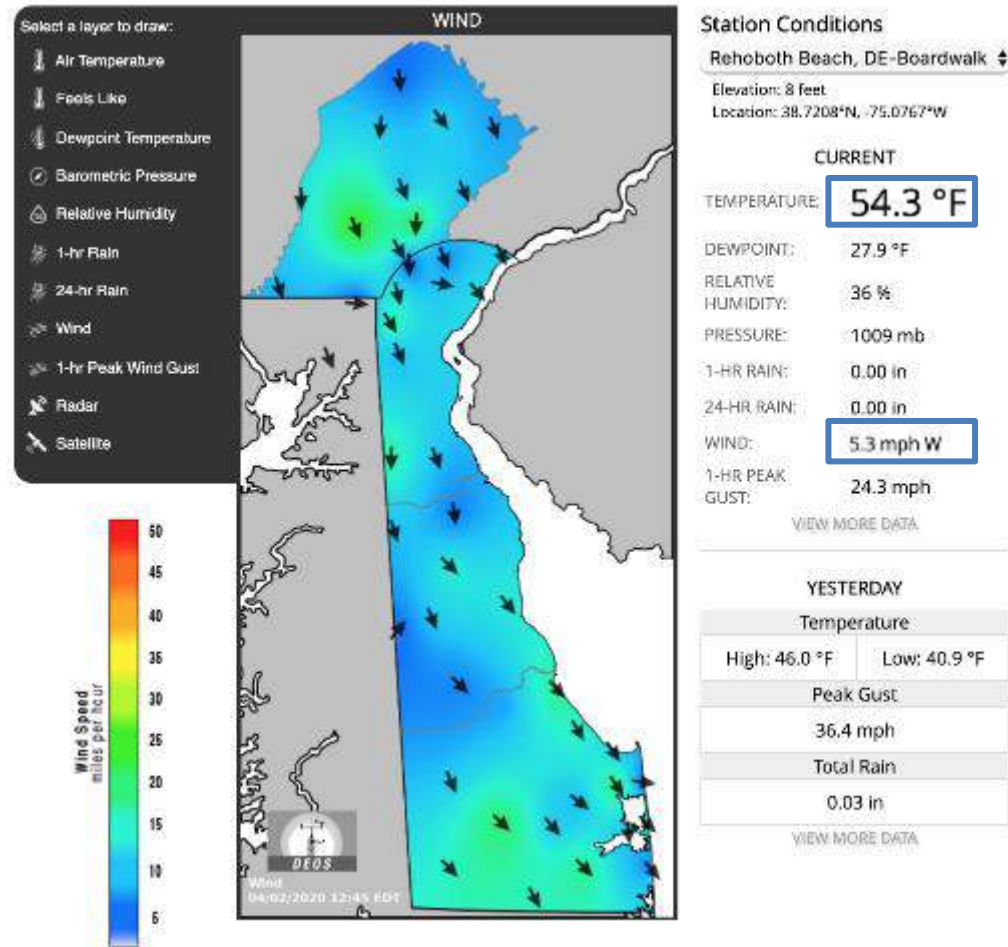
Sustained wind speed

Use the nearest DEOS weather station

2 of 4

Weather Conditions Tools

Current Conditions



Delaware Environmental Observing System
(DEOS) Website
www.deos.udel.edu

TERP Alert - Great tomorrow!

18 messages

Bill MacL. <billmac1221@gmail.com>

Cc: Nivette Perez-Perez <nperezperez@inlandbays.org>, Jamesfarm@inlandbays.org

Fri, Jun 4, 2021 at 6:08 PM

Happy Friday.

This is the TERP Alert with information for our 12th survey day, Saturday, June 5th.

Here is this evening's general forecast for our survey areas tomorrow:

Type	Criteria	Forecast	
Air Temperature	Greater than 50 degrees F	82	●
Cloud Cover	Less than 50%	26%	●
Wind Speed	8 or less mph	SW 8 MPH	●

As usual the wind is supposed to increase as the day progresses. Otherwise it looks like a great day!

Here are some unofficial counts thru 6/3:

Total # Svys	Total # Terps
48	361

Note that over 100 of the total terrapins were seen in a cove adjacent to the Bethany Bay survey site. Also, sometimes I find it easy to forget that we're collecting data for analysis by the CIB, and seeing where there are few or no terrapins can be just as important as seeing a lot!

Following are the locations we still need to hit. Thank you in advance to those who have let me know that they will be covering some of these

Surveys Needed	Land/Water
Botanic Gardens	land
Pot Nets	land
Beach Cove	water
Camp Arrowhead	water
Dirickson Creek	water
Herring Creek	water
Miller Creek	water

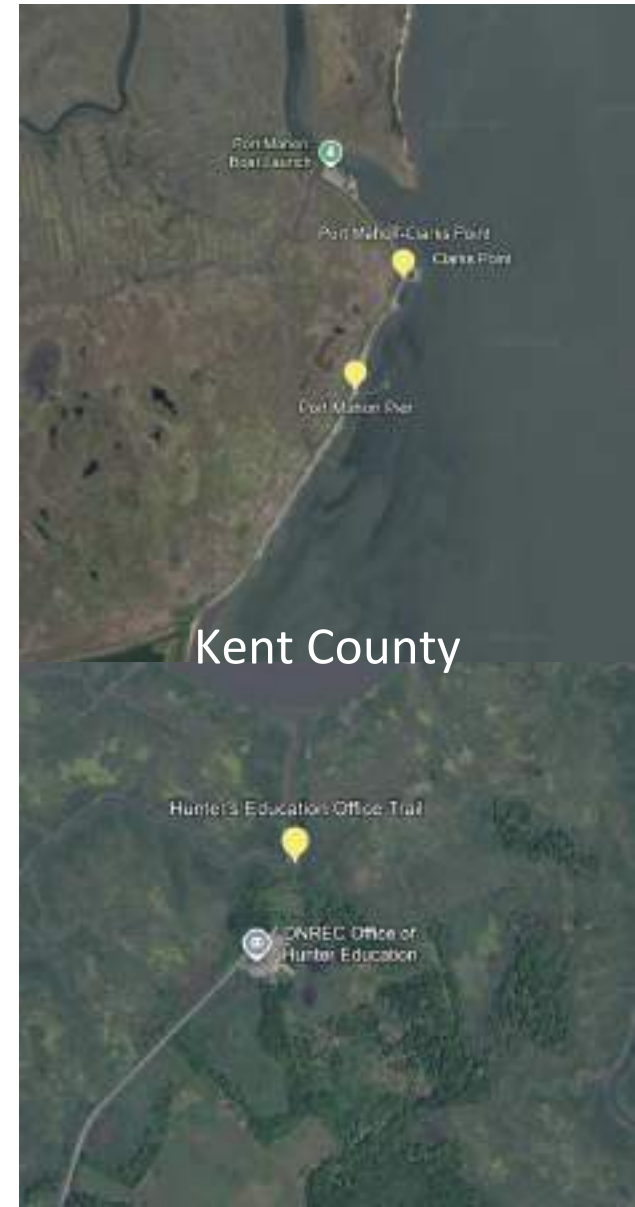
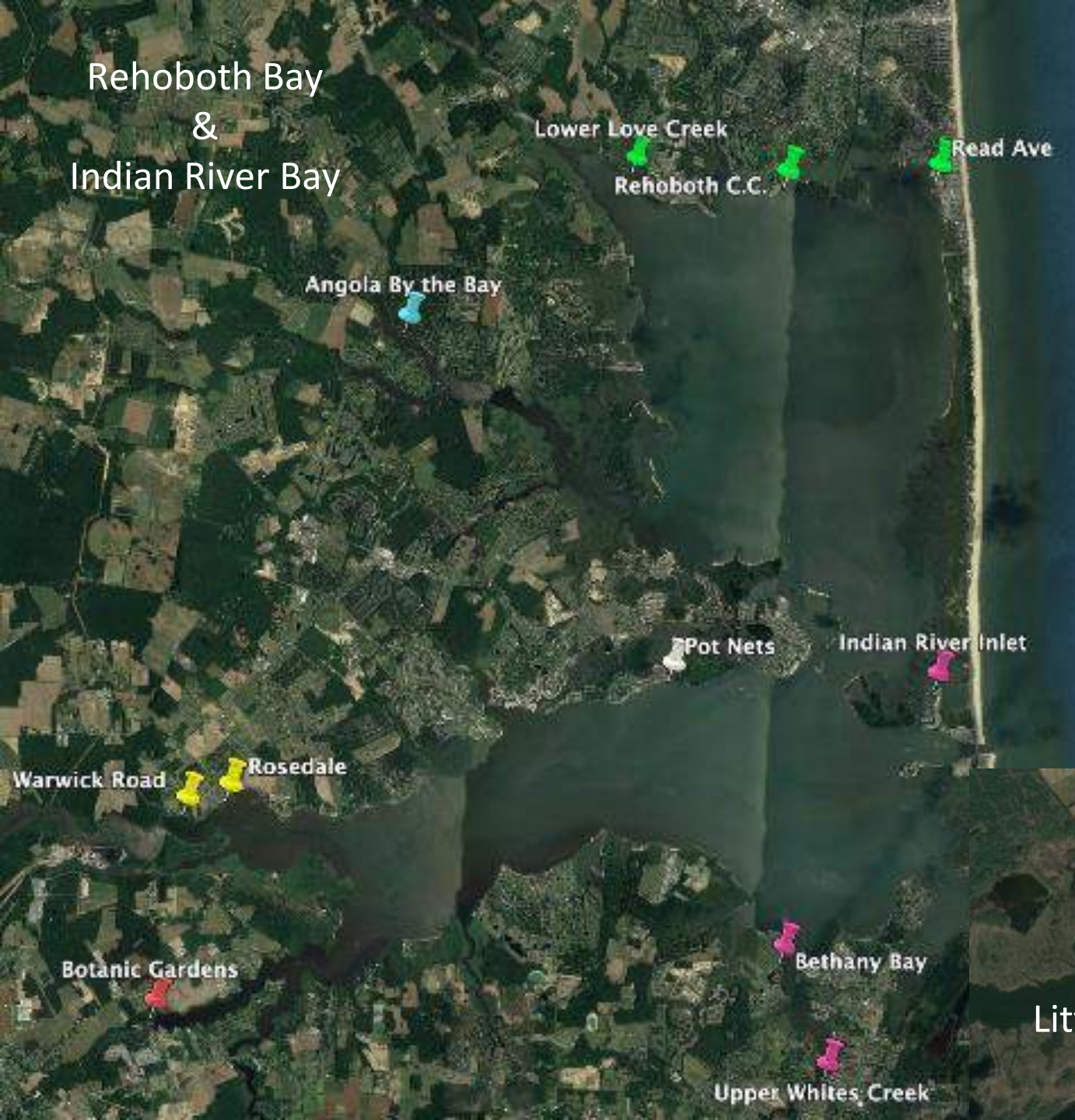
I again attached the CIB Terrapin Survey Volunteer sign for your car just in case you still need it.

Thanks and good luck tomorrow!

Bill

'TerpAlert' by Bill MacLachlan

Land Survey



Observation

- Count #1: Start time, Number of Terrapins Observed, and End time.
- Wait three minutes before performing the second period/sweep
- Capture any pictures of interest associated to this survey
- Shared any additional observations

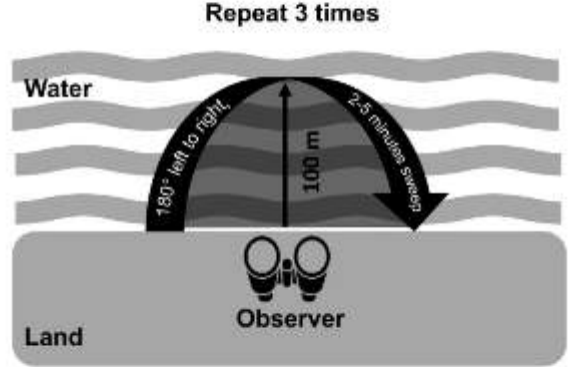
DE Inland Bays Terrapin Survey

×

☰

Observation

Observe Left to Right 180 degrees



The single observation point will be from a designated access location. Position yourselves to have an unobstructed view of the water and perform three 180-degree visual sweeps left to right, with three minutes between each sweep. Each sweep should take approximately 2-5 minutes to complete.

▼ Count #1

Count #1 Start Time *

🕒 Time

<

3 of 4

>

Survey Completion

- Report End time
- Volunteer hours including travel
- Signature

DE Inland Bays Terrapin Survey

Survey Completion

Survey End Time

Time

Including travel, how many hours did you spend on this volunteer activity today?

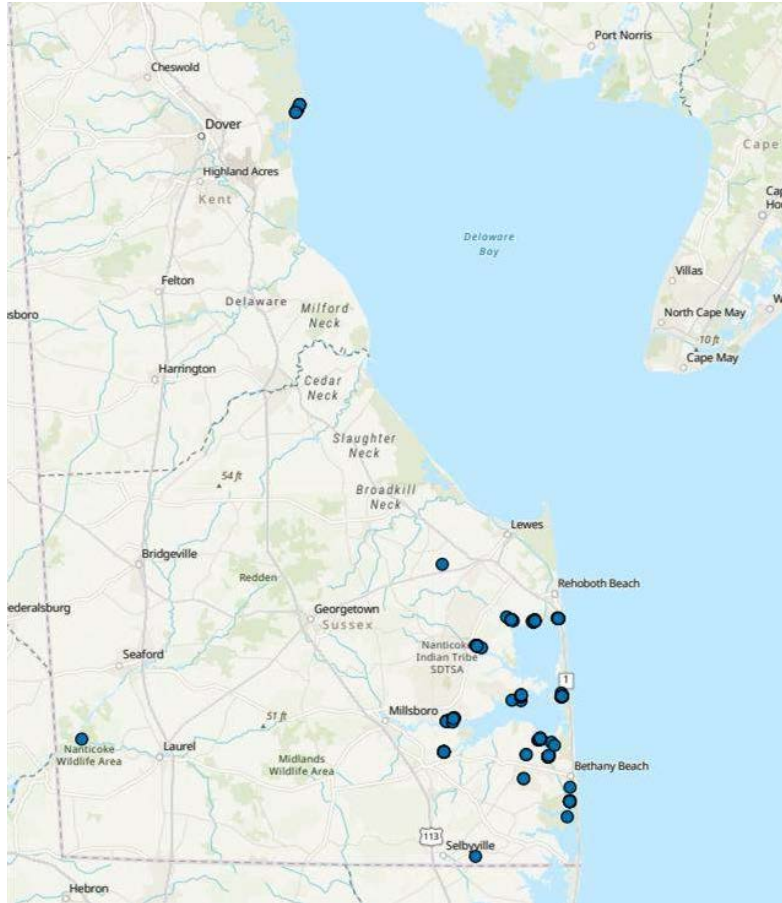
Round to nearest quarter hour (1 hour 15 minutes = 1.25)

Signature

By signing below, I certify that I have completed the survey and reported my volunteer hours to the best of my knowledge.

4 of 4

Preliminary Results



- A total of 105 surveys as of June 29, 2026
- Avg # Terrapin per survey, range 0-35 terrapins
- Bethany Bay has the most visits.

Survey Site	Number of Surveys
Angola by the Bay	4
Bethany Bay	16
Botanic Gardens	7
Indian River Inlet	10
Jefferson Creek	8
Lower Love Creek	13
Port Mahon Pier	4
Port mahon-Clarks Point	4
Pot Nets/Whitehouse Beach	11
Read Avenue	8
Rehoboth Beach Country Club	9
Rosedale	3
Upper Whites Creek	8
Warwick Road	0
Total	105

Osprey Survey





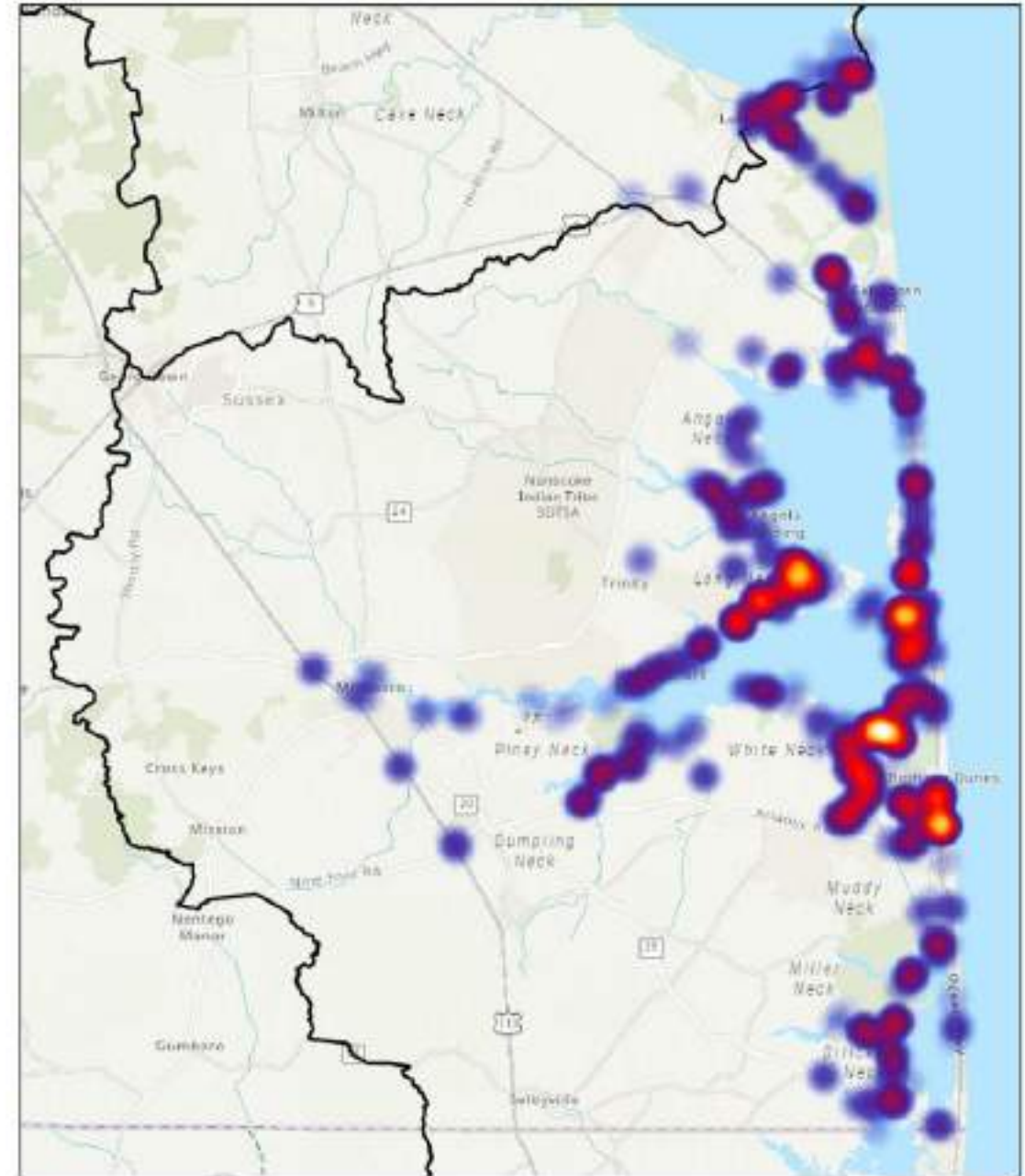
Ospreys

Pandion haliaetus

- Ospreys are good indicators of environmental quality because they are at the top of the food chain.
- The species have rebounded significantly following the 1972 ban on the use of DDT pesticides, which caused the collapse of many raptor populations due to thinning eggshells.
- Ninety-two active Osprey nests were counted in 2014 by DNREC's aerial surveys.
- During the 2021 Center's Osprey Survey, a total of 279 active nests were counted.

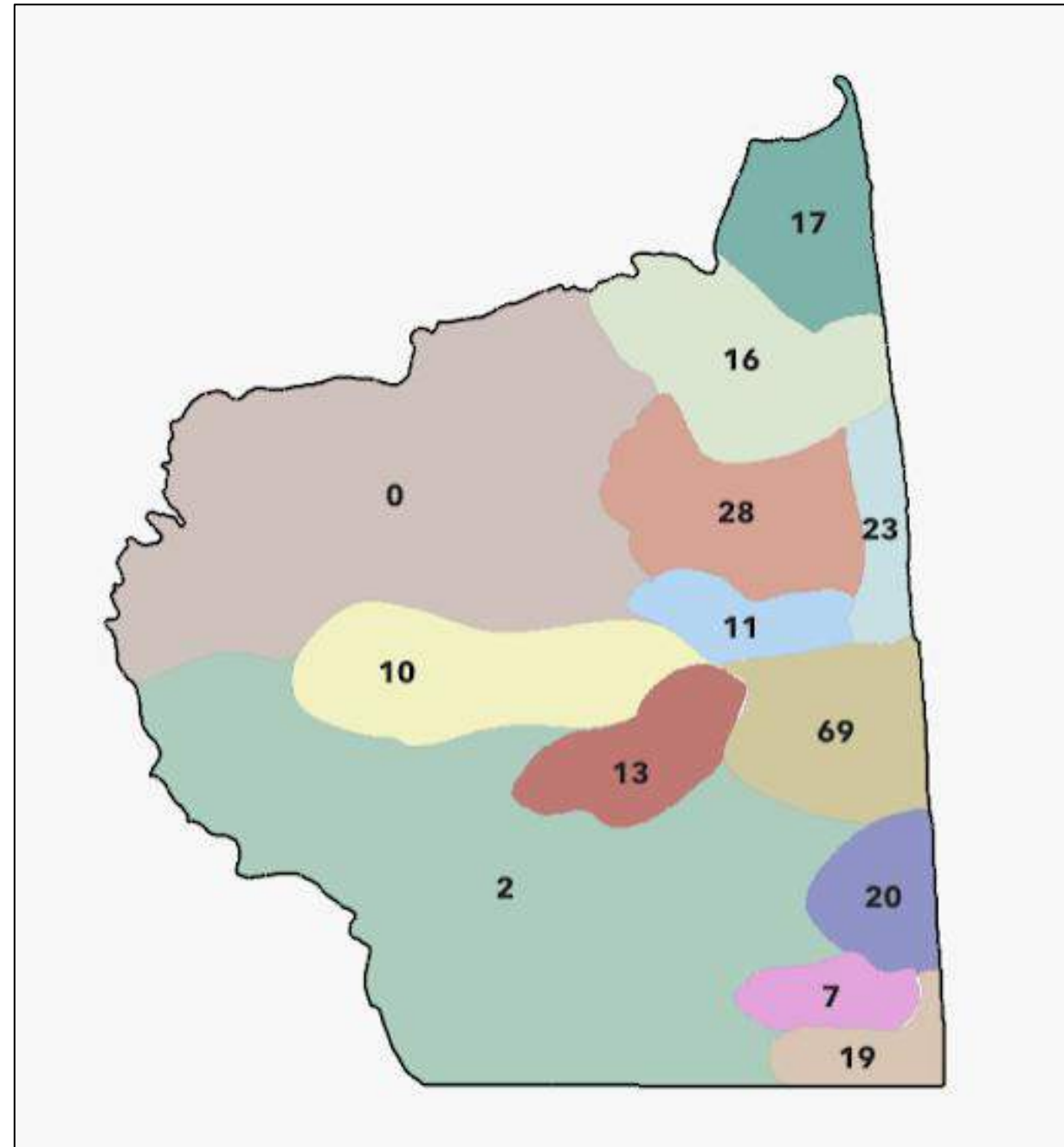
Preliminary Results

- 928 reports were received
 - 388 potential nests
 - 538 active
 - 2 unknown
- Data presented are reports and do not indicate presence or absence
(red/yellow areas are representative of multiple reports)



Preliminary Results

- 235 active nest were identified in 2025
- Data presented are total nests by volunteer assigned survey zones.



NE Regional Terrapin Watch



Have you found a terrapin:

- By the side of the road?
- On your backyard?
- On your campground?
- When kayaking/boating?

AND thought...to whom or how should I report it?



If the answer is **YES!**, we have a solution for you.

NEW NE Regional Terrapin Watch!

This short survey will provide us with key information about the distribution, number, activity, and conditions of terrapins throughout our Northeast region.

Traveling throughout the Northeast region?- No problem! Use the app from Virginia to Massachusetts.

Option to add a Network Code



DID YOU SEE A TERRAPIN?

REPORT IT TO THE NORTHEAST TERRAPIN WATCH!

The **NE Terrapin Watch** is a free, short survey collecting key data on terrapin distribution, numbers, activity, and conditions across the Northeast, all in one app!

- 1 Download the ArcGIS Survey123 app
- 2 Open app and click "Continue without signing in"
- 3 Scan the QR code using the button in the search bar and complete the questions

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Survey Questions

Terrapin Description & Contact Information

- Full Name
- Email
- Phone Number

NE Regional Terrapin Watch

Did you see a Diamondback Terrapin?

The Diamondback Terrapin is an estuarine species distinguishable by its grey skin with dark spots, beaks ("lips") pale yellow, and their shell when variable in coloration it is generally greyish with darker rings on the scutes. Females are larger than males, measuring up to nine-inches in shell length. See some example images of these amazing species below.



Full Name *

✓

Observation Details

- Date & Time
- Location

NE Regional Terrapin Watch

Date and Time of Observation *

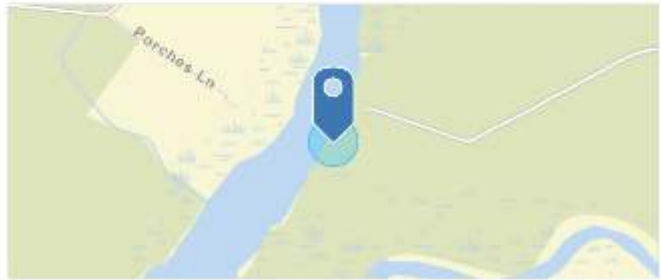
Friday, April 3, 2026

9:51 AM

Please drop a pin in the map as close as possible to the place where you observed the terrapin(s). *

Tip: Click the map to open. Zoom in to the location of your pin and set the pin by clicking the bottom right check mark.

38°34'N 75°40'W ± 100.0 m



Have you previously seen terrapins here?

✓

Observation Details

- Number of Terrapins
- Behavior
- Signs of activity

NE Regional Terrapin Watch

How many terrapins are you seeing?

We suggest that you take at least 5 minutes to do a left to right visual sweep/scan, in search of any additional terrapins that you may have overlooked .

What kind of terrapin behavior are you observing? (Select all that apply)

☐ In water

☐ Swimming/ Basking

☐ Moving toward the water

☐ Moving away from the water

☐ Digging holes

☐ Egg laying

☐ Still/ Resting

☐ Nest cover

NE Regional Terrapin Watch

Do you see any other sign of terrapin activity?

☐ No

☐ Predated nest(s)

☐ Predated egg(s)

☐ Tracks

☐ Test holes

☐ Deceased terrapin

Describe the habitat where you are seeing sign of terrapin.

Possible answers could include: road, edge of trail, low marsh, etc.

Please take a picture of the terrapin(s) or the area where you observed it. You can add up to

Pictures

- Please take a picture of the terrapin(s) or the area where you observed it.
- You can add up to three pictures.

NE Regional Terrapin Watch

Please take a picture of the terrapin(s) or the area where you observed it. You can add up to three pictures.
For example terrapins in the water can be difficult to capture but the location with some landmark is helpful.

Picture 2

Picture 3

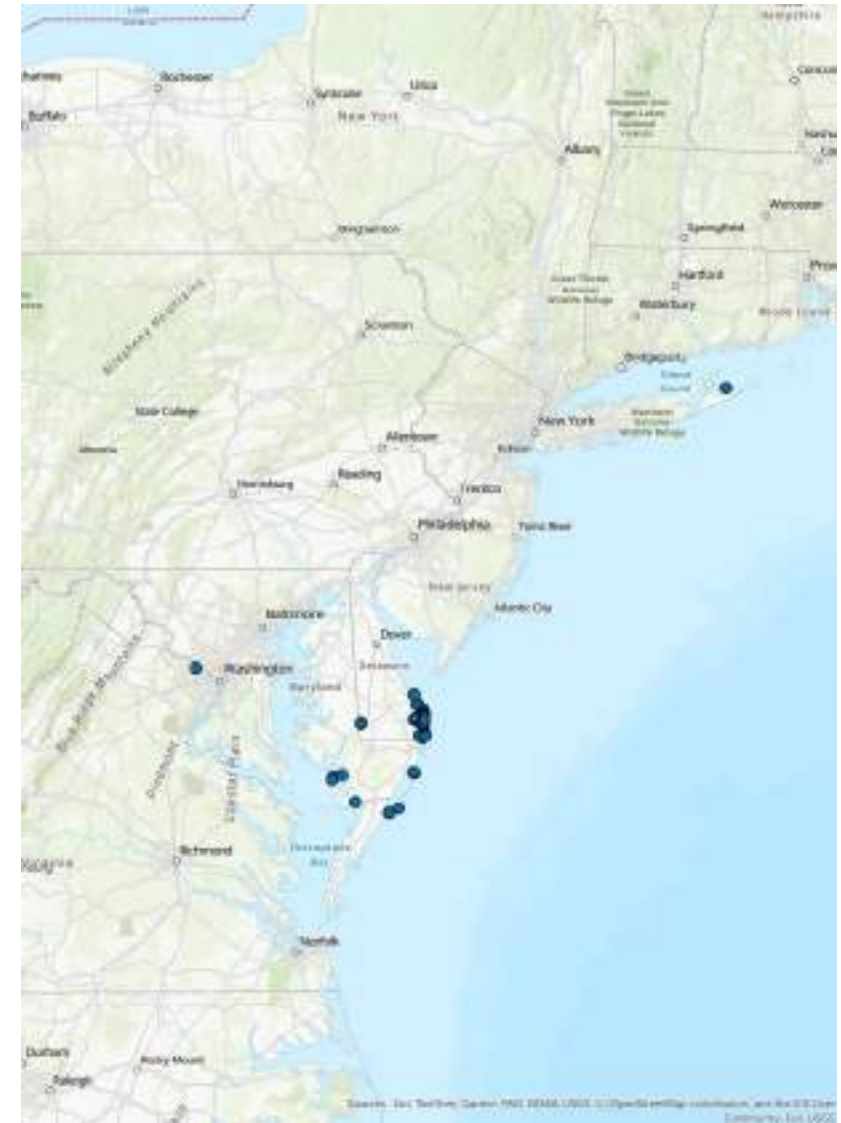
 

Please enter a network code, if

✓

Preliminary Results

Report Locations	Number of Reports
Delaware	63
Maryland	6
New York	1
Virginia	3
Total	73



- A total of 73 terrapin reports as of 6/29/2026
- Most of them for a single terrapin observation